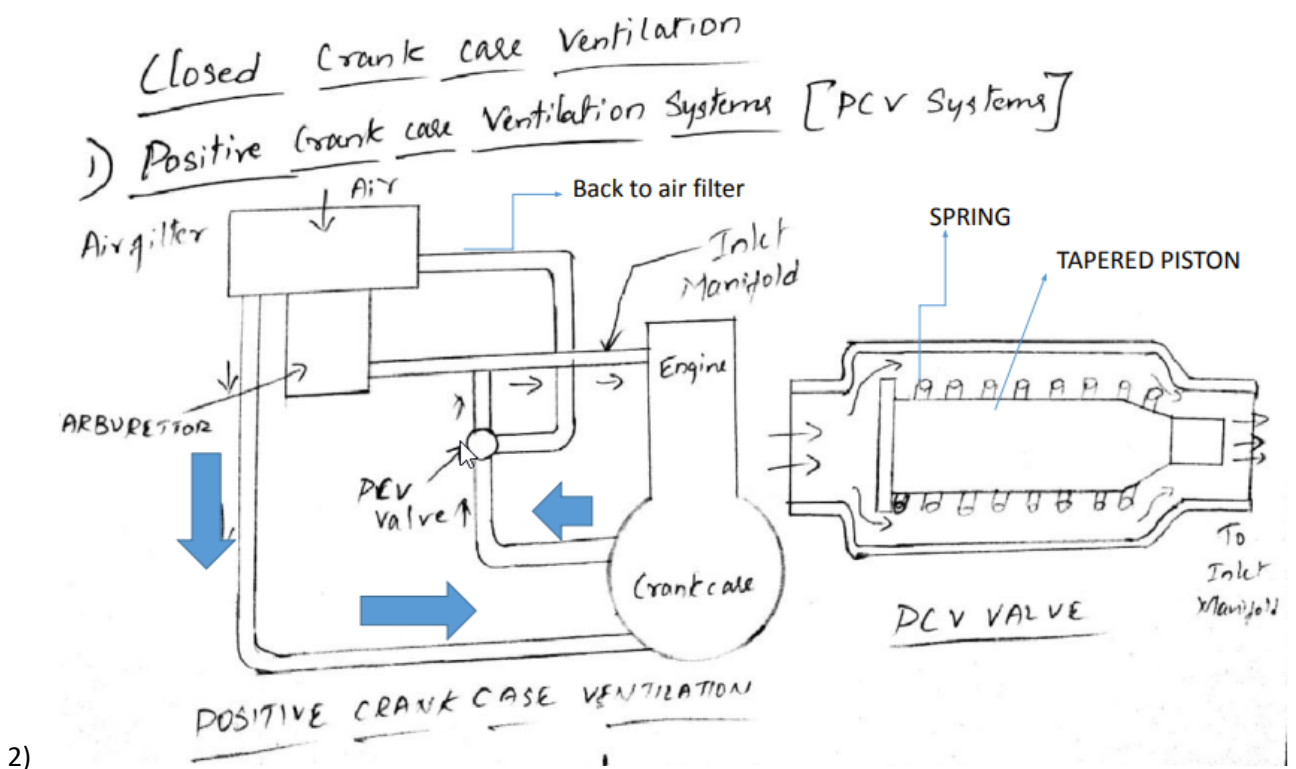


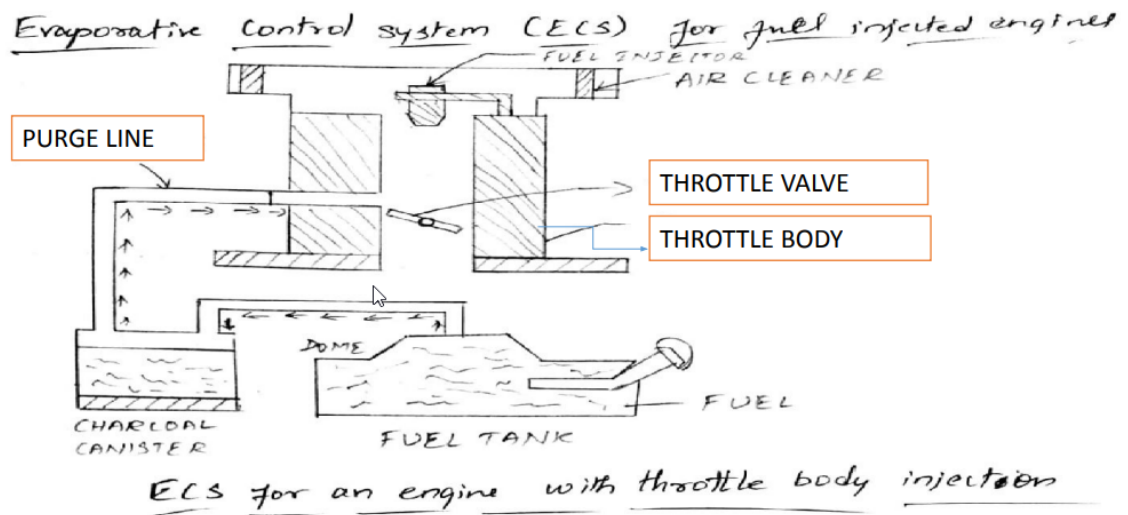
AUTOMOTIVE ENGINEERING IAT3 SOLUTION

- Hydrocarbons (HC) • Resulting from the release of unburned fuel into the atmosphere. • Produced by incomplete combustion or by fuel evaporation. • Mostly related to ignition problems. • Effect could be eye, throat, and lung irritation, and, possibly cancer. Carbon Monoxide (CO) • Extremely toxic emission resulting from the release of partially burned fuel (incomplete combustion of petroleum-based fuel). • CO prevents human blood cells from carrying oxygen to body tissue. • Symptoms are headaches, nausea, blurred vision, and fatigue. • A rich air-fuel would increase CO; lean air-fuel mixture would lower CO emissions. Oxides of Nitrogen (NOx) • Produced by extremely high temperatures during combustion.

Sources of emission in Automobiles The sources of emissions in Automobiles are 1. Blow-by gases: From Crankcase 2. Fuel vapour: From Fuel tank and Carburettor 3. Exhaust gas: through Exhaust tail pipe • Engine Crankcase Blow-by Fumes (20%)– heating oil and burning of fuel that blows past piston rings and into the crankcase. • Fuel Vapour (20%) – chemicals that enter the air as fuel evaporate. • Engine Exhaust (60%)- blown out the tailpipe when engine burns a hydrocarbon based fuel



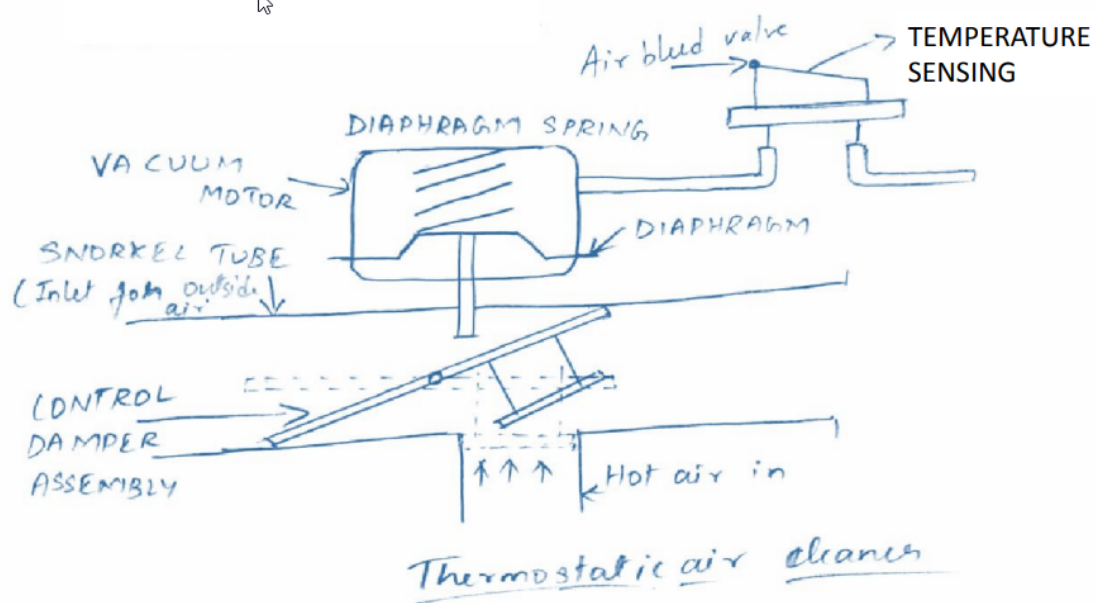
Evaporative Control System for fuel injected engines (ECS)



3)

- Since this system is used for fuel injected vehicles we are concentrating only on the vapours formed in fuel tank
- A typical system consists of a small canister full of charcoal, purge valve, hoses, vents in the fuel lines and a sealed fuel tank cap.
- When fuel evaporates inside the gas tank, the excess vapors are transferred to the charcoal canister. They're stored there until they can safely be transferred back to the engine to be burned with the normal air-fuel mixture.
- As the purge line from canister is connected to the throttle body.
- The purge line is fitted with purge valve which can be operated electrically or with the help of Vacuum.
- The Vapours can be transferred into the throttle body by operating the Purge valve when ever rich fuel is required usually it controlled by ECU.

Thermostatic Air cleaner



4)

- The Thermostatic Air Cleaner System is an emissions control device that was designed to deliver temperature-regulated air to the intake manifold (warm air for cold engine conditions).
- It consists of an temperature sensing spring, air bleed valve, diaphragm, vacuum motor, snorkel tube, damper spring, control damper assembly.
- The temperature sensing spring senses the temperature of the incoming air.
- The initial position of damper assembly is shown in dotted line.
- Below the snorkel tube the air is stored which is placed next to the exhaust manifold which keeps the air warm.
- During cold conditions the temperature sensing spring closes the air bleed valve so that the vacuum of inlet manifold now acts in vacuum motor, because of that the diaphragm moves upwards against the spring force.
- There by lifting the damper assembly in the snorkel tube.
- As the damper assembly lifts up the hot air enters into the inlet manifold and aids in combustion process.
- There by reducing the formation of unburnt HC and Carbon monoxide.

5)

Euro Norms

Chronology of Euro Norms

norms = operational year = vehicle type

- EURO-I = 1993 = for passenger car
- EURO-II = 1996 = for passenger car
- EURO-III = 2000 = any vehicle
- EURO-IV = 2005 = any vehicle
- EURO-V = 2008 = for heavy good vehicle

Stage	CO	HC+NO _x	PM	km/year	Number of ca
g/km					
Compression Ignition (Diesel)					
Euro 1	3.16	1.13	0.14		
Euro 2	1.0	0.7	0.08		
Euro 3	0.64	0.56	0.05		
Euro 4	0.50	0.30	0.025		
Euro 5	0.50	0.23	0.005		
Euro 6	0.50	0.17	0.005		
Positive Ignition (Gasoline)					
Euro 1	3.16	1.13	-		
Euro 2	2.2	0.5	-		
Euro 3	2.30	0.35	-		
Euro 4	1.0	0.18	-		
Euro 5	1.0	0.16	0.005		
Euro 6	1.0	0.16	0.005		