

### Draw and explain Battery ignition system.

Battery Ignition system : It consists of six or twelve volt battery, ignition switch, induction coil, circuit breaker condenser and distributor. All the circuit parts are shown in figure. One terminal of battery is ground to engine frame and other is connected through the ignition switch to one primary terminal of induction coil. The other primary connection is connected to one end of contact point of circuit breaker and through closed points to ground. The ignition switch is made on and engine is cranked. When the contacts touch, the current flows from the battery to the switch.

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### Define the following related I.C. engine

i) Indicated Power (ip) is defined as the power developed by combustion of fuel in the cylinder of engine. It is always more than brake power. ii) Brake Power:- □ The useful power which is available at the crank shaft is called as brake power. □ It is denoted by "B.P." □ It has unit kW iii) B.S.F.C: It is the weight of fuel required to develop 1KW of the brake power for period of 1 hour. Unit of B.S.F.C is Kg/KWh. It is defined as the amount of fuel consumed per unit of brake power developed per hour.

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## Explain MPFI system with sketch

### **MPFI system :**

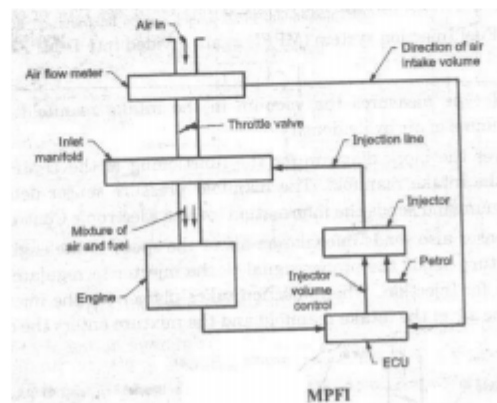
The MPFI system is a port fuel-injection system in which, fuel metering is regulated by the engine speed and the amount of air which actually enters the engine. This is called air-mass metering or air-flow metering.

The block diagram of an MPFI system explaining its functioning is shown in Fig. After the air enters into the intake manifold, the air-flow sensor measures the amount of air that enters into the intake.

The air-flow sensor sends the information of the air-flow meter to the ECU. Similarly, the speed sensor sends information about the speed of the engine to the ECU.

The ECU processes the information received and sends the proper signal to the injector, in order to regulate the amount of petrol supply for injection.

When injection takes place from the injector, the petrol mixes with the air in the intake manifold and the mixture enters the cylinder.



## Explain different stages of combustion in C.I. engine with sketch.

1) Ignition delay period : During this fuel has already admitted but has not yet ignited. This is counted from start of injection to the point where P-O curve separates from pure air compression curve. 2) Rapid or uncontrolled combustion : In this stage pressure rise because of during the delay period the fuel droplet have time to spread over a wide area and fresh air around them.

## Name the different sensors used in ECU of modern automobile with their application....

Crank angle sensor: A permanent magnet inductive signal generator is mounted in close proximity to the flywheel, where it radiates a magnetic field. As the flywheel spins and the pins are rotated in the magnetic field, an alternating (AC) waveform is delivered to the ECM to indicate speed of rotation.

Air Flow Sensor (AFS): The AFS is normally located between the air filter and the throttle body. As air flows through the sensor, it deflects a vane (flap) which wipes a potentiometer resistance track and so varies the resistance of the track and generates a variable voltage signal.

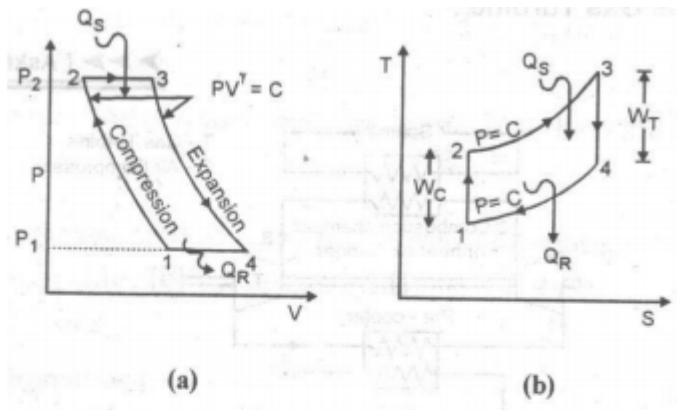
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## Draw and explain simple vapour absorption refrigeration system

A Simple Vapor absorption system consists of evaporator, absorber, generator, condenser, expansion valve, pump & reducing valve. In this system ammonia is used as refrigerant and solution is used is aqua ammonia. Strong solution of aqua ammonia contains as much as ammonia as it can and weak solution contains less ammonia. The compressor of vapor compressor system is replaced by an absorber, generator, reducing valve and pump. The heat flow in the system at generator, and work is supplied to pump. Ammonia vapors coming out of evaporator are drawn in absorber.

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Draw constant pressure closed cycle gas turbine on P.V and T-S planes.



Process 1-2 : Isentropic compression

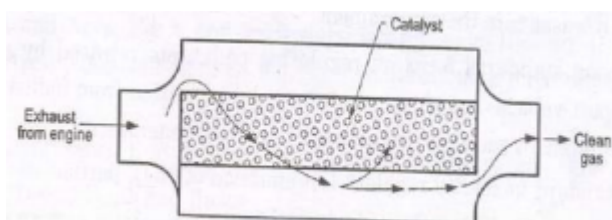
Process 2-3: Heat addition at constant pressure

Process 3-4 : : Isentropic expansion

Process 4-1: Heat rejection at constant pressure

$$\eta_{th} = 1 - \frac{1}{(R_p)^{\frac{\gamma-1}{\gamma}}}$$

What is catalytic convertor ? Explain two way catalytic convertor with neat sketch



What is pre-ignition ? State any two factors responsible for pre-ignition.

In S.I. engine, the spark is timed to occur at a definite point just before the end of the compression stroke. If the ignition starts, due to any other reason, when the piston is still doing its compression stroke, it is known as pre - ignition. Following factors are responsible for Pre - ignition 1) High compression ratio 2) Overheated spark plug 3) Incandescent carbon deposit in cylinder wall 4) Overheated exhaust valve 5) It may occur due to faulty timing of spark production

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Define the following terms related to compressor....

i] Compressor capacity:- □ It is the volume of air delivered by the compressor in m<sup>3</sup> per minute □ It is express in m<sup>3</sup> /min ii) FAD:- □ It is the volume of air delivered by compressor under the intake conditions of temperature and pressure. □ Capacity of compressor is generally given in terms of free air delivery.

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