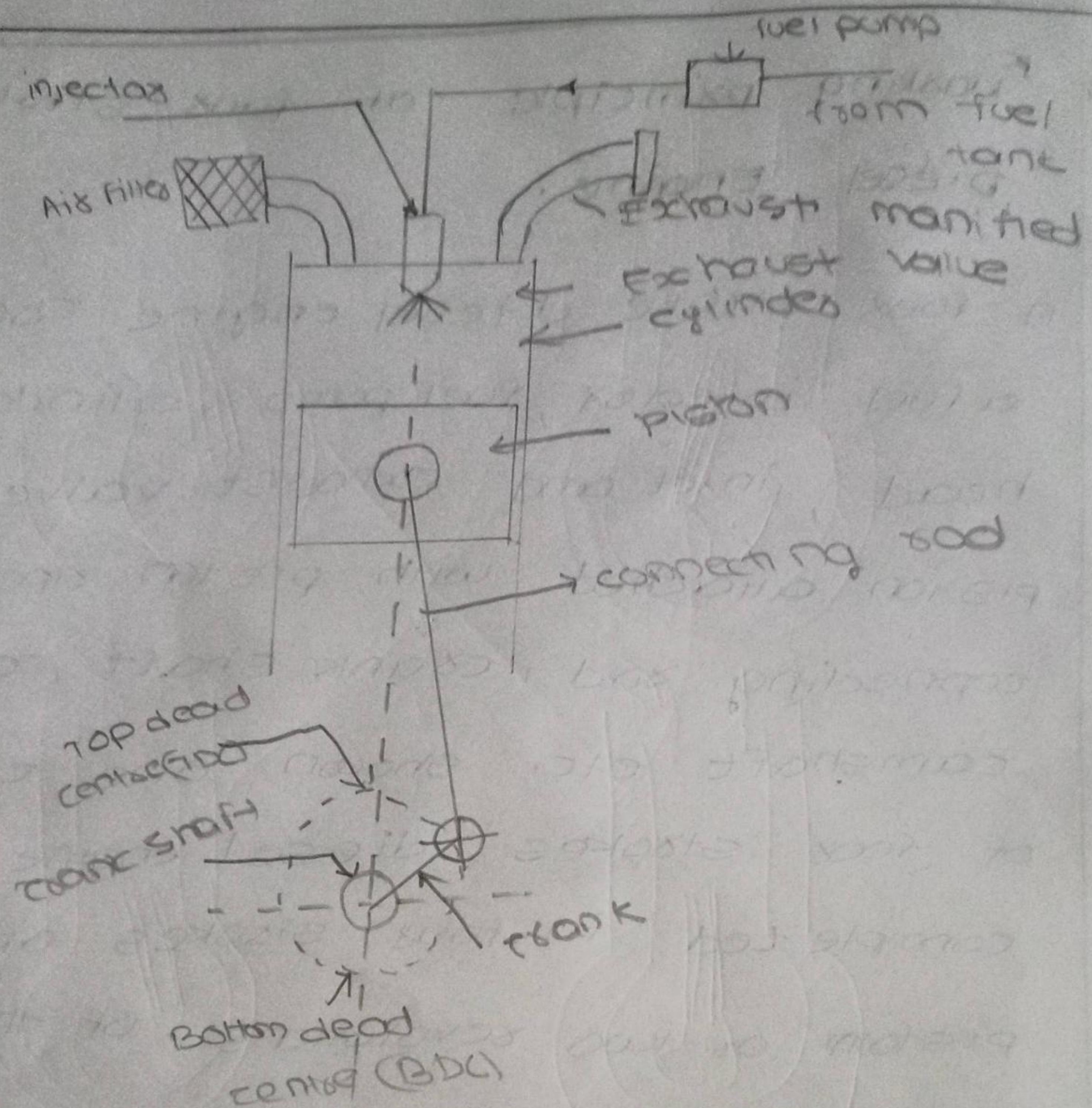


(1) Working principle of four stroke Diesel Engine.

A four stroke diesel engine contains a fuel injector, fuel pump, cylinder head, inlet and exhaust valves, piston attached with piston rings, connecting rod, crank shaft, cam, camshaft etc. shown one cycle of four strokes diesel engine is completed in four strokes of the piston or two revolutions of the crank shaft.

(a) working of engine.

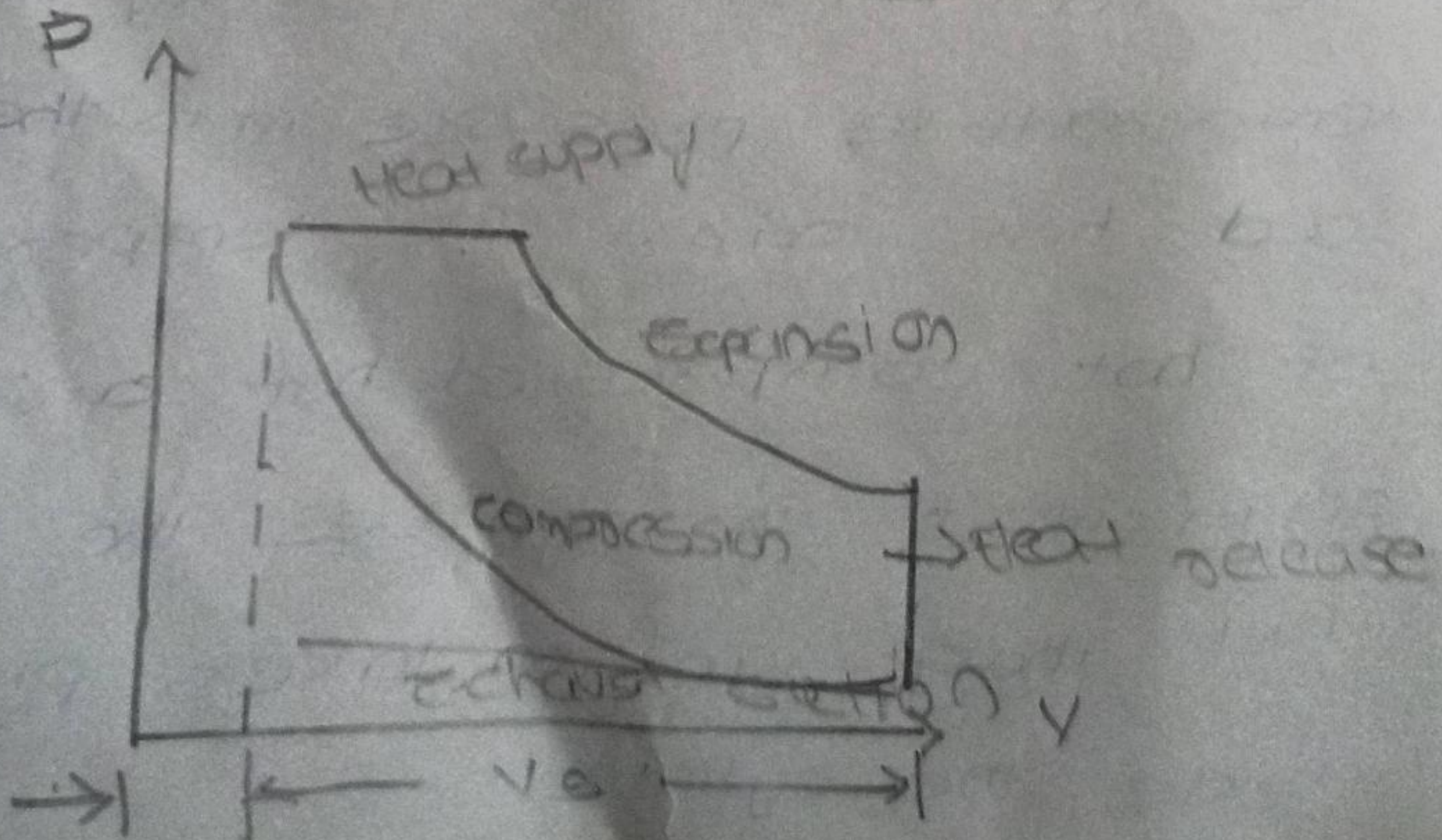
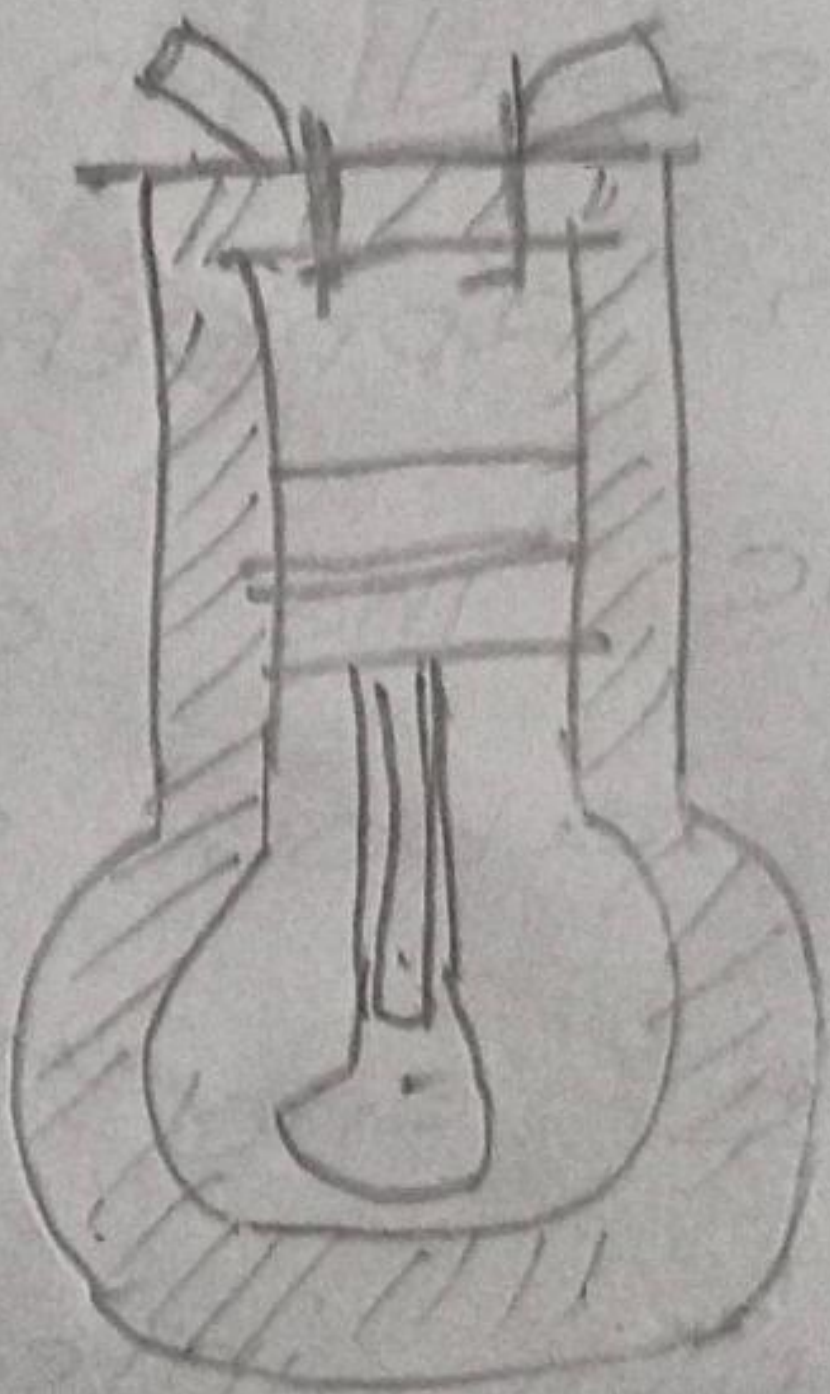
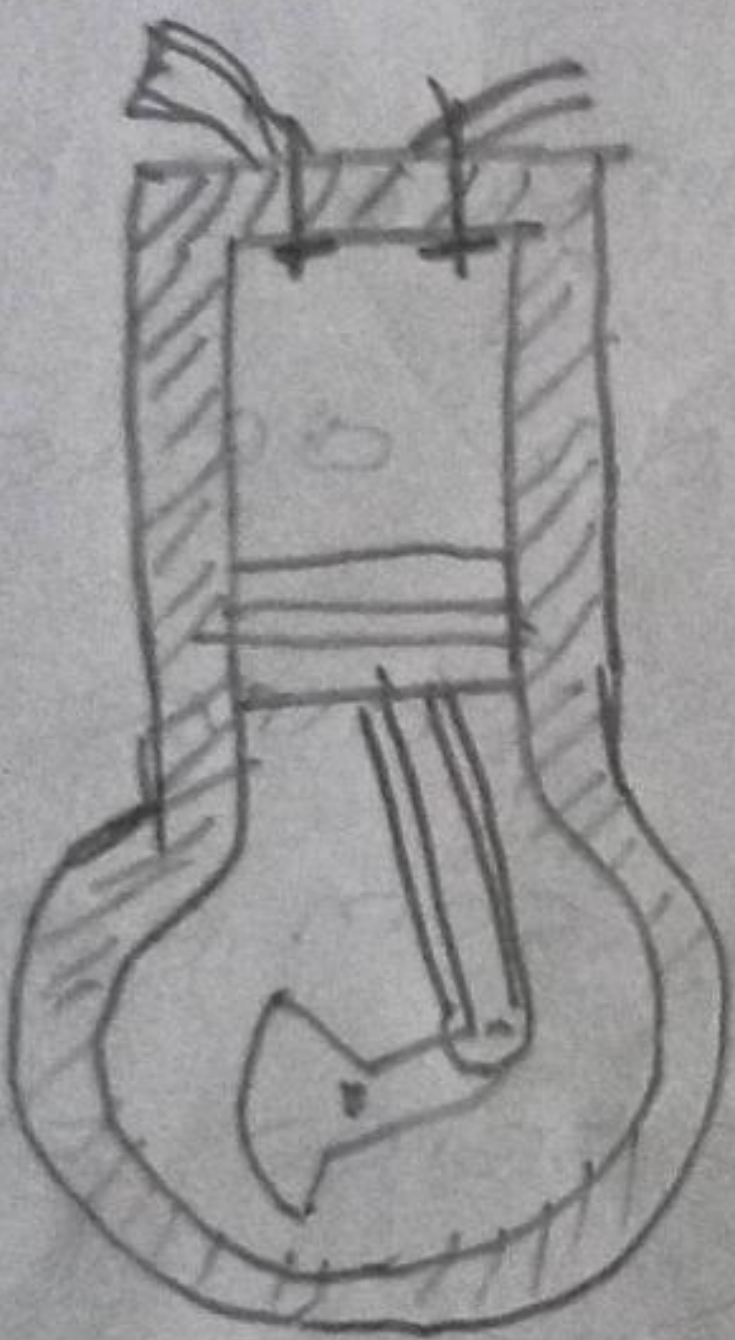
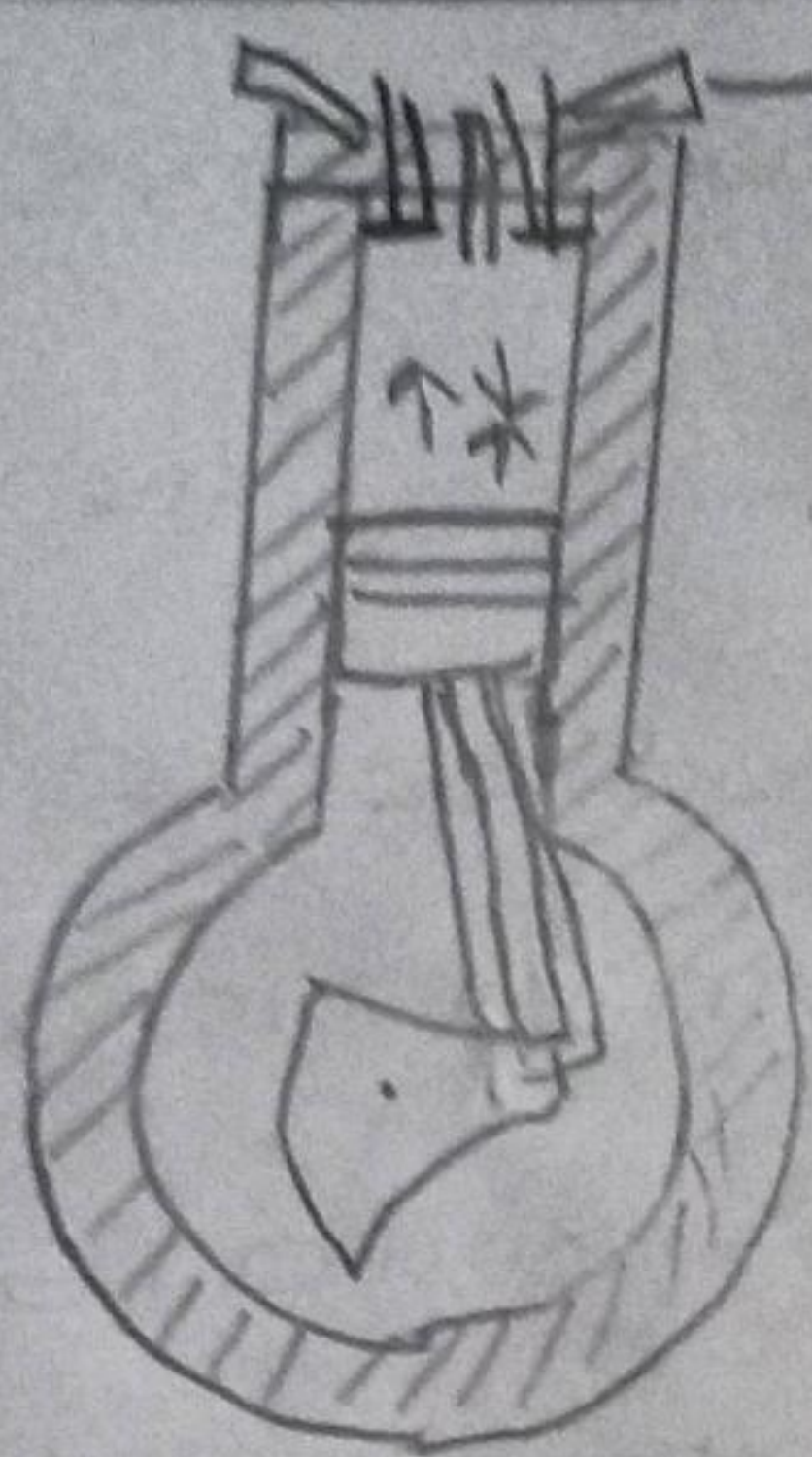
The four-stroke engine operates in a similar manner of a four stroke petrol engine. A schematic of a four stroke diesel engine is



1. suction stroke :- The inlet valve opens the exhaust valve closed, only air is drawn in to the cylinder as the piston move from the top dead centre to the bottom dead centre this stroke ends as the piston

approaches the bottom dead centre

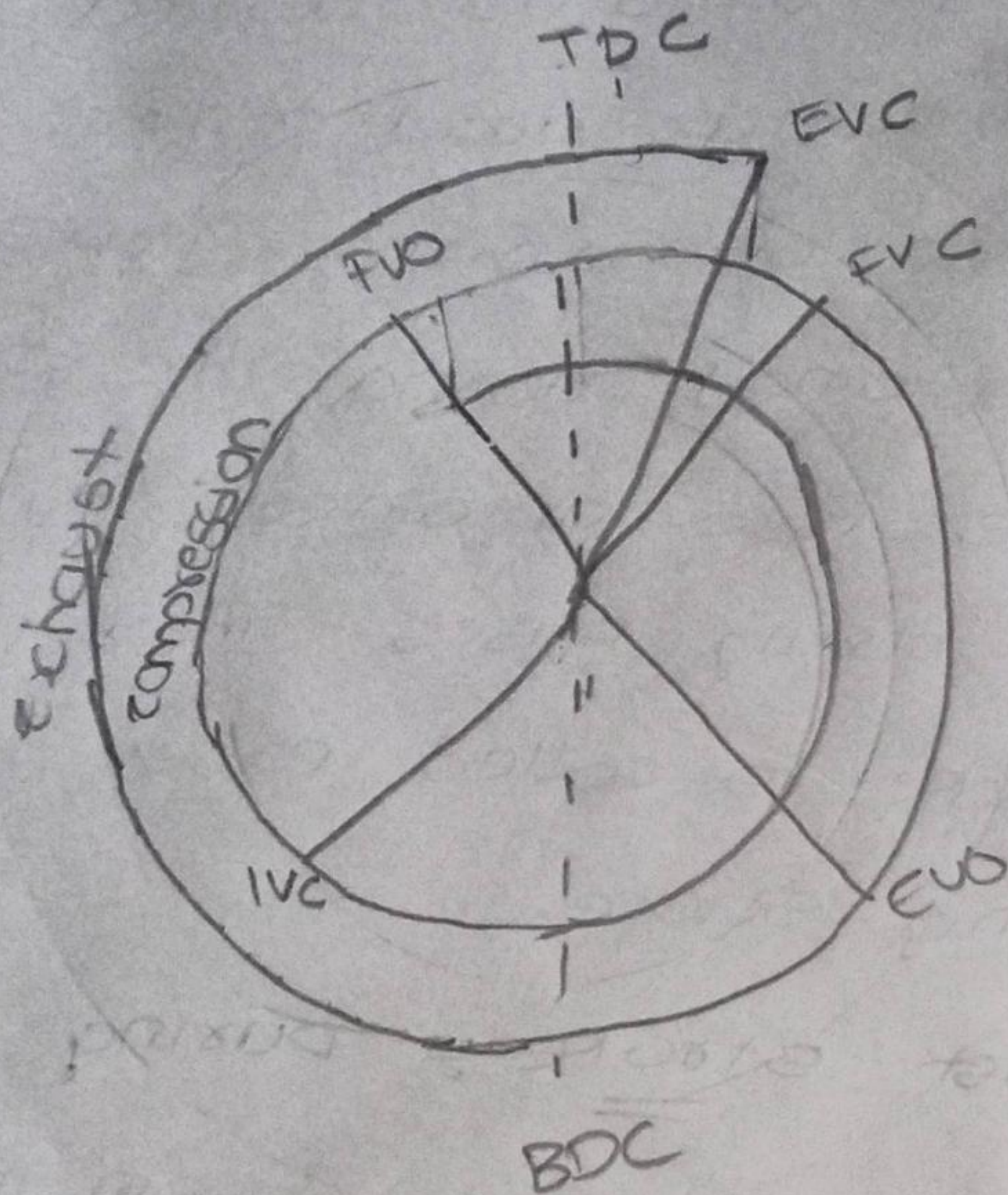
2. compression stroke :- AS the piston moves from the ~~bottom~~ dead centre to the top dead centre, the inlet valve closes, exhaust valve remains closed the air trapped in to the cylinder is compressed in the cylinder till the piston approaches the top dead centre. The air temperature reaches about 800°C by compression. at the end of compression stroke the fuel injector at very high temperature pressure in to the compressed hot air. The temperature of hot compressed hot air is sufficient to ignite the injected fuel thus ignition takes place inside the cylinder.



3. Expansion stroke : During this stroke both valves remain closed. The piston at the top dead centre is forced by expansion of burning gases. Power work is obtained during the stroke due to the force obtained by high pressure burning gases. Therefore, this stroke is called power stroke or working stroke.

4. Exhaust stroke : During this stroke, the piston moves from the bottom dead centre to the top dead centre, exhaust valve open and the inlet valve remains closed. Burnt gases of the previous stroke are expelled out from the cylinder by upward movement of the piston.

(2) Valve - Timing Diagram



IVO : inlet valve opens 10° to 20° before TDC

IVC : inlet valve closes 20° to 50° after BDC

EVO : Exhaust valve opens approximately 16° after TDC

EVC : Exhaust valve approximately 15° after TDC

FVO : fuel injection starts 5 to 15° before TDC

FVC : fuel injection stops 15° to 20° after TDC

Theoretically, the inlet and exhaust valves open at dead centres as shown in fig. A typical valve-timing diagram for a four stroke diesel engine is shown in fig 1.19

(c) Applications

The four-stroke diesel engine is one of the most popular prime movers. It is manufactured from 50mm to 1000 mm cylinder bore with speeds ranging from 100 rpm to 4500 rpm. It has wide applications. Some of these are

1. small pumping sets for agriculture
2. construction machinery.

3. Air compressors and drilling jigs

4. tractors, jeeps, cars, taxis, buses, trucks.

5. Diesel - electric locomotives

6. small power plants, mobile electric generating plants

7. Boats and ships

8. power saws, bulldozers, tanks etc

3. Write about battery ignition (or)
magnetic ignition system

sol: Battery ignition system

The battery ignition system is shown below.
The battery is used as a source of electric energy. When the ignition energy is turned on, and the rotating cam makes the contact on breaker

points, a low current flows from the battery in primary winding through the ignition switch, and the primary circuit is completed through the ground. The magnetic field is set up around the secondary winding.

When the rotating cam opens the breaker points the flow of low-voltage current stops and the magnetic field collapses, inducing a high-voltage surge of about 30,000 volts in the secondary winding. This high voltage current passes to the distributor which connects the spark plug in correct sequence depending upon the firing order of the engine.

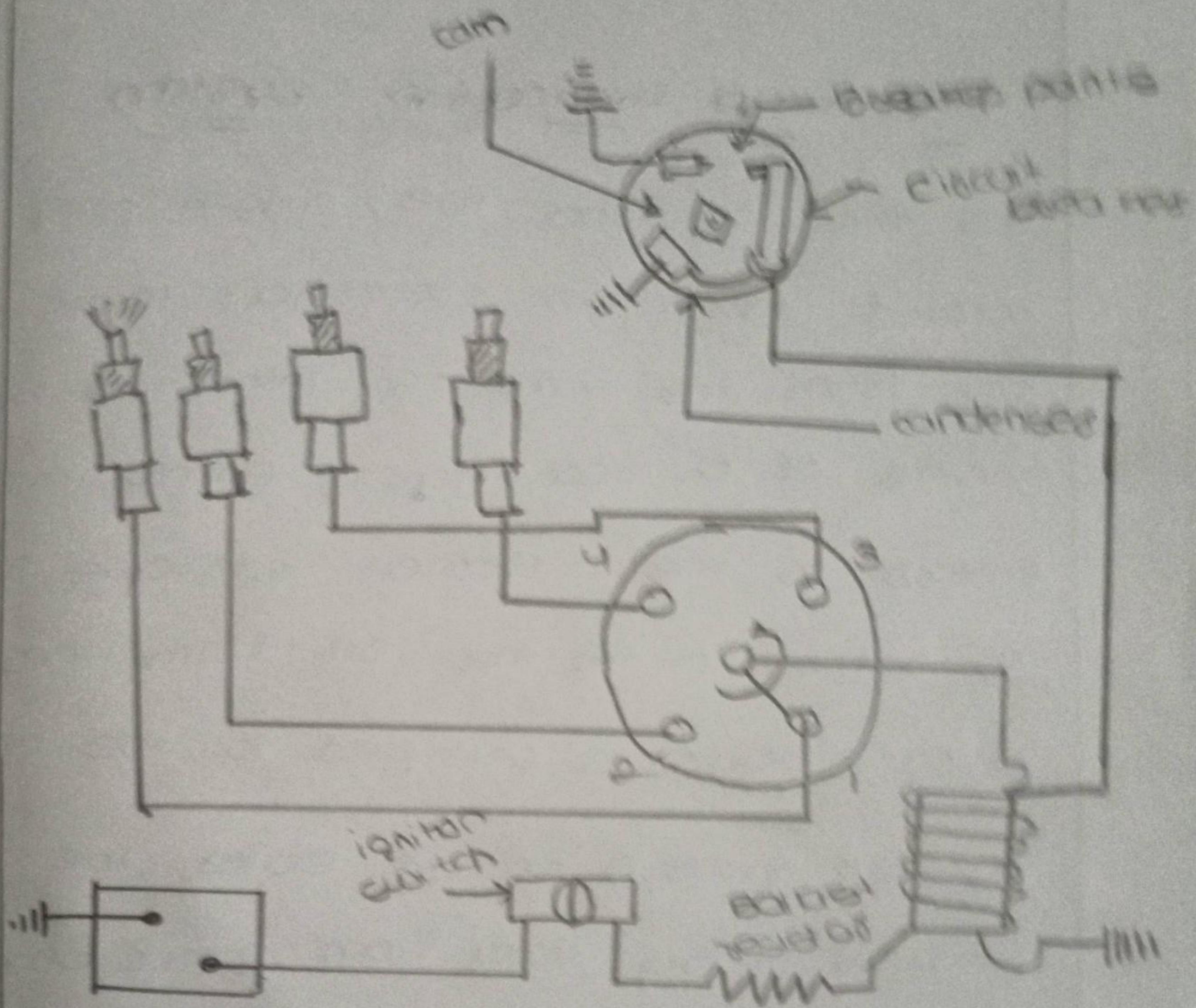
Advantages of Battery Ignition system

1. It gives constant voltage irrespective of speed of the engine.
2. It gives better spark at low speed and starting of engine.
3. It is reliable and requires very less maintenance except battery and contact points.
4. The battery is charged by dynamo run by engine.

Disadvantages of Battery Ignition system

1. The system is bulky and occupies more space.
2. At higher speed the sparking voltage is low.
3. If battery is discharged the engine cannot be started as induction.

coil fails to operate.



4 write about any one lubrication system

Day-Sump Lubrication System

In this system, the oil supply is carried from an external tank. The oil from the sump is pumped by means of a scavenging pump through filters to the external storage tank. As shown in fig the oil from the storage tank is pumped to the engine cylinder through an oil cooler. The oil pressure may vary from 3 to 8 bar.

The day-sump lubrication system is generally used for heavy-duty engines.

