Experiment: 2

Objective:

To Study Compression ignition Engine.

Introduction:

The compression ignition engine or diesel engine is the type that has most commonly been used for power generation, particularly in off - grid situations. The engine uses a higher compression ratio than spark ignition engine.

Theory:

Compression ignition or CT engine is an aninternae combustion engine in which ignition of the fuel takes place with the help of compressed air. As the air is compressed, it gets hot and the heat is used for the ignition and burning of the fuel. In this engine the air is sucked during suction stroke and then this air is compressed while compression stroke.. At the end of the compression Stroke fuel is injected into the cylinder and it gets ignited from the heat of compressed air and burning process begins. Diesel is used as fuel for the working of this engine. It works on the principle of this Diesel Cycle. The compression ratio of this type of engine usually ranges from 12 and 1 to 22 and 1. It is used in heavy dirty vehicles like buses, trucks ships etc.

CI engine has no carburetor and spark plug, but has fuel injector. This engine workes on the principle of diesel engine.

4 Stroke CI Engine:

Similar to ST engine CI engine has the four strokes in one complete burning cycle. The four Strokes are known as intake, compression, expansion, and exhaust.

These four strokes or one cycle of operation in two revolutions of crankshaft.

Intake or Suction Stroke (Process 0-1):

The piston is about to move from the top dead center (TOC) to bottom dead center (BDC). The iniet valve open and the exhaust valve closed. In CI engine air is alone dawn in the cylinder. The pressure remains constant (atmospheric pressure) during the process.

Compression Stroke ( process 1-2):

Both the intake and exhaust valve is closed. The piston moves from BDC to TDC. The previously drawn air inside the air is the compressed into the Volume. The fuel is injected in the cylinder at the end of compression stroke. The temperature at the end of compression is very high enough to self-ignite the full that is the reason caused compression ignition engine.

Power Stroke (Process 2-3 and 3-4):

Both inlet and exhaust valve remain closed in the process when the piston moving from TDC to BDC, this fuel is injected in such a way that combustion maintains the constant pressure inside the cylinder while volume increases (process 2-3). After the complete injection of fuel the pressure decreases as the volume increases (process 3-4) . At the end of this storcke, the exhaust valve opens and pressure caused to atmospheric.

Exhaust stroke (process 4-1)

The exhaust valve is open. The piston travel from BDC to TDC and express the banned gas from the cylinder some residual burned gas get trapped in clearance volume, this will later get mixed with fresh air during the next suction stroke.

2 - Stroke CI Engine:

1st Stroke:

As the piston starts rising from its BDC, it closes the transfer. and the exhaust part. The air which is already there in the cylinder is compressed. At the same time with the upward movement of the piston, Vacuum is created with crank case. As soon as the inlet part is uncovered the fresh air is sucken crarnk case. The charging is continued until the crank case and the space in the cylinder beneath the pilton is filled with the air.

2nd Stroke:

Slightly the completion of the compression stroke a very fine spray of diesel is injected into the compressed air (which is at a very high temperature). This fuel ignites spontaneously.

Pressure is exerted on the crown of the piston. due to combustion of the air and the piston is pushed in the downward direction producing some usefuel power. The downward movement of the piston will first close the inlet parit and then it will compress the air already sucked in the crank case.

Just at the end of power stroke, the piston uncovers the exhaust part and the transfer part simultaneously. The expanded gasses starts escaping through the exhaust part and the same time the fresh ai which is already compressed in the crank case reshes into the cylinder through the transfer part and thus the cycle is repeated again.