

# **Internal Combustion Engine Lab**

## **Subject overview:**

An Internal Combustion Engine converts chemical energy into mechanical work to run different systems of vehicle. Aim behind this laboratory work is to teach student about basic laws of thermodynamics, heat transfer between various systems and conversion of heat to one form to another form. Students can enhance their knowledge by applying theoretical principle to practical skills. A range of different engines and fuels make students eager to brush their knowledge. After learning, students can understand difference between working of SI and CI engines, evaluate parameters of emissions and understand performance parameters of different engines.



## **4-stroke multi-cylinder Petrol Engine:**

The setup consists of 4-stroke, multi-cylinders petrol (MPFI) engine connected to hydraulic dynamometer for engine loading. The setup has stand-alone type independent panel box consisting of air box, fuel tank, manometer, fuel measuring unit, and digital temperature indicator. The setup enables study of engine for brake power, BMEP, brake thermal efficiency, volumetric efficiency, specific fuel consumption, air-fuel ratio and heat balance. Provision is also made for conducting Morse test.



## **4-stroke 4-cylinder Petrol Engine:**

The test setup consists of 4-stroke Petrol Engine coupled to eddy-current dynamometer. The

engine is 4-cylinder, water cooled engine running at constant speed. The dynamometer provides



variable load on engine to study engine performance under variable load conditions. Exhaust gas calorimeter is used for estimation of heat carried away by exhaust gases for determination of heat balance of the engine. Air is supplied to the engine through an air box, fitted with orifice plate. The instrumentation console includes measuring instruments for engine speed, fuel consumption & temperature of water, gases.

#### **4-stroke 4-cylinder Diesel Engine:**

The setup consists of 4-stroke 4-cylinder Diesel Engine connected to Hydraulic type dynamometer for loading. It is provided with necessary instruments for combustion pressure and crank-angle measurements. These signals are interfaced to computer through engine indicator for brake power Vs. speed & load, heat converted to brake power, heat goes to exhaust gasses, heat unaccounted and  $P_Q$ - $P_V$  diagrams.



#### **4-stroke single-cylinder Diesel Engine:**



The setup consists of 4-stroke single cylinder Diesel Engine connected to hydraulic type dynamometer to load engine on different loading conditions. Engine is started by hand cranking. Instrument panel consists of temperature indicator and load on engine. Speed of the engine is measured by tachometer separately. The setup enables study of engine performance for brake power, indicated power, frictional power, BMEP and IMEP.

#### **4-stroke single cylinder Dual Fuel Engine:**

A unique kind of engine consisting of 4-stroke single cylinder engine which is run on kerosene as well as on LPG. AC/DC kind of dynamometer is used to load engine on different conditions. Changeover of fuel is done with the help of disclosed supply of conventional fuel to engine. The setup enables study of engine performance parameters.



### **Variable Compression Ratio (VCR) Engine:**



The setup consists of single cylinder, four stroke, VCR (Variable Compression Ratio) kerosene engine connected to AC/DC type dynamometer for loading. The compression ratio can be changed without stopping the engine and without altering the combustion chamber geometry by specially designed screw on cylinder block arrangement. The setup enables study of VCR engine performance parameter like BP, IP and heat balance sheet.