CHAPTER 1

1.1 Introduction:

As a renewable energy sources for the gasoline engines, alcohols gain importance recently. Alcohols are being used as fuel blending components to improve unleaded gasoline octane quality. Normally, methanol and ethanol are the main blending components. Addition of small amounts of alcohols, with carbon numbers greater than one, improves fuel blend water tolerance, material compatibility, and volatility characteristics. Increasing the alcohol content, which also increases oxygen content, up to a certain concentration (when blended with gasoline) improves the blends’ knock resistance.

These renewable energy sources have attracted the attention of researchers as alternative fuel due to their high octane number. In addition, these are also clean energy sources and can be obtained from the biomass alcohols with low carbon like ethanol.

Due to the high evaporation heat, high octane number and high flammability temperature, ethyl alcohol has positive influence on the engine performance and increases the compression ratio. In spite of its positive effect when used in gasoline engine as alternative fuel, it is necessary to make some modification on the engine. The fuel system requires more fuel. The vehicle takes less distance with alcohol fuel than gasoline.

In this study, the effect of compression ratio on engine performance and exhaust emissions will be examined at stoichiometric air/fuel ratio, full load in a single cylinder, four strokes, with variable compression ratio and spark ignition engine. In this experimentation, test fuels will be prepared using 99.9% pure ethanol and gasoline blended with the volumetric ratios of (viz. E0, E5, E10, E20 and E30). These percentages represent the ratios of ethanol amount in total blends. In the experiments to be performed at different throttle openings and engine speeds, the torque values needs to be found out when used different ratios of ethanol–gasoline blends compared with pure gasoline. Therefore, the leaning effect of ethanol to increase the air fuel equivalence ratio (k) to higher value, and make the burning closer to be stoichiometric. As a result the better combustion can be achieved and higher torque output can be acquired.
The existing experimental setup consists of a Variable Compression Ratio Engine having a facility of changing the compression ratio. It is also a multi-fuel engine which can run on various fuels. This facility has attracted the attention of research towards using various blends of alcohols with gasoline. This engine setup is a computerized setup with a facility to gather all the information from the engine, compile and analyze the data and also plotting graphs of the result. This has also reduced the task of doing large number of calculations.