SUMMARY
The work present in this thesis is summarised as in the following chapters.

**Chapter 1:**
In this chapter, the general introduction about the corrosion is given. Corrosion is the deterioration of the metal when it interacts with the atmosphere. The chapter includes history of corrosion and statements made by the ancient scientists, various conditions responsible for the corrosion and the role of environment in corrosion, consequences of the corrosion as a loss of economy of the country per year. The factors affecting the corrosion of a metal are also discussed. Various methods available in the literature to study corrosion and the types of inhibitors needed to inhibit the corrosion of a metal are given in this chapter.

**Chapter 2:**
Here in this chapter, literature is reviewed on the basis of type of metal and nature of insulator selected.

**Chapter 3:**
This chapter reports the protocols needed for the weight loss method, polarization measurement method, and cathodic protection method. The general characteristics of the IS 2062 E 250 B mild steel are reported here. The preparation of coupons, stock solutions and the synthesis of the four Schiff bases are well documented in this chapter. Following four Schiff bases are synthesized.

- N’-(3,4-dimethoxybenzylidene)pyridine-3-carbohydrazide,
- N’-[E]-[(4-hydroxyphenyl)methylidene]pyridine-3-carbohydrazide,
- N’-[E]-[phenylmethylidene] pyridine-3-carbohydrazide and
- N’-[E]-[(4-methoxy phenyl) methylidene]pyridine-3-carbohydrazide

The Schiff bases are characterized by the IR, Mass, CHNS and NMR spectrum. Details of characterization of Schiff bases by CHNS, IR spectrum, mass spectroscopy, NMR spectrum and TGA/DSC analysis are given here.
Chapter 4:
The chapter four describes complete detail of the weight loss method. The adsorption characteristics of the inhibitor on the metal surface are discussed here. The various constraints like effect of the concentration of inhibitor, effect of concentration of acid, effect of immersion period, and effect of temperature are reported here. The results reveal that the time of immersion is less, the amount adsorbed on the surface of metal is more. So hence the more efficient inhibition is observed at lower concentration of the selected inhibitor.
The weight loss measurement showed that the extent of corrosion i.e. rate of corrosion increases with rise in temperature in uninhibited corrosive media. But in presence of schiff bases which acts as inhibitors, the rate of corrosion was quantitatively less and that the inhibition efficiencies were found in the range of 80 - 99%. The thermodynamic parameters like activation enthalpy, heat of adsorption, Gibb’s free energy and entropy are calculated. The entropy of adsorption in the 0.5M was found from 0.88 - 2485.13 J/K/mol and in 1.0M from 0.62 - 1249.9 J/K/mol in presence of the selected inhibitor. This data revealed that if the values of the activation energy will be lower, the formation of chemical bonding on the metal surface will occur easily. The coverage of the surface by the inhibitors depends upon the activation energy of adsorption.
The negative values indicate that the adsorption process is exothermic in nature and comparatively adsorb strongly on the surface while the positive values show that the adsorption is endothermic in nature and thus weakly adsorbed on the metal surface. Similar results are observed here.
The negative values of the free energy of adsorption show strong interaction between the inhibitor and the mild steel surface. Also the process of adsorption will be spontaneous. This is in confirmation with our results also.
The positive values of the entropy of adsorption reveal that the process of adsorption of the schiff base on the metal surface are spontaneous.
and as the value increases the interaction between inhibitor and the metal become stronger.

Chapter 5:
The results obtained by the potential measurements are given in this chapter. The plots of the potential with time and the table of shift of potential are shown. The potential shift is found to be in positive direction at the immersion period in presence of inhibitors indicating the effectiveness of the substance and immediate passivation of the metal surface takes place with formation of film on the metal surface. The higher positive shift represents the stronger adsorption of the substance on the surface of the metal. The shift in positive direction may be due to the formation of the protective film of the inhibitor on the metal surface or may be of the formation of the complexes of insoluble product on the metal surface. Similar results are observed in our study.

From the potential measurements, it has been found that the behaviour of mild steel in 0.5M and 1.0M concentrations of the trichloroacetic acid is approximately similar. This means that the inhibition of the mild steel in trichloroacetic acid by schiff bases follow the same mechanism.

Chapter 6:
Here, polarization studies are made by using three electrode system. The Tafel parameters, transfer coefficient and efficiencies are calculated. Results of polarization support the view that the corrosion of mild steel in 0.5M and 1.0M trichloroacetic acid is significantly inhibited by the schiff base. The data shows that both cathodic and anodic areas are affected by the inhibitor and inhibitors behave like the mixed type of the inhibitors. The shift in the Tafel parameters and potential measurements showed that the inhibitor schiff bases have more control on anodic reactions than the cathodic reactions.
It is anticipated that the process of inhibition is because of the adsorption of the schiff bases on the surface of the mild steel. The adsorption of the inhibitor on the surface of the mild steel is chemisorption and it does not desorbs with the change in potential. The schiff bases adsorb on the metal surface and form a passive film. The inhibitors inhibit the corrosion by physical adsorption, chemisorption or film formation. All these involve the electrostatic interactions between the metal surface and the inhibitor. The negative ions are adsorbed on the positively charged metal surface. From Tafel curves, the increase in Tafel parameters for corrosion inhibition of mild steel by schiff bases in 0.5M trichloroacetic acid show the remarkable inhibition by the inhibitors, the inhibitors reduce both the anodic and cathodic current diverisions suggest that the schiff bases are mixed type of inhibitors. The schiff bases showed the anodic and cathodic potentials shift in the negative direction indicating that the schiff base predominantly inhibit the cathodic process.

Chapter 7:
In this chapter, the cathodic protection of mild steel in 0.5M and 1.0M trichloroacetic acid in presence of the schiff bases is studied at 35°C. The current density for complete protection is reduced in presence of the inhibitor as compared to the plain acid. The results show that the conjoint effect is more at lower current densities but the protection provided will be less as compared to the individual current. On increasing the current densities, the weight loss of the mild steel gets decreased. The ratio of $i_p/i_i$ is greater than unity indicates that the additional current is required to overcome the anodic part under mixed control. The potential values in cathodic protection dependent on the anodic and cathodic reactions and internal resistance and values are found to be negative. In the present study the potential values are...
significantly negative that supports the view that the cathode is properly protected.

**Chapter 8:**
In this chapter, the electrochemical impedance parameters like solution resistance (Rs), double layer capacitance (Cdl), inhibition efficiencies and constant phase element ($Q$) are recorded. The results show that the corrosion inhibition of steel occurred mainly by charge transfer. The shapes of the Nyquist plots are approximately same but their diameters increase as the concentration of the schiff base increases. The data of charge transfer resistance, diffusion layer capacitance, the resistance of the accumulated species at the metal solution interface and the resistance of the inhibitor film indicates that the adsorption of the inhibitor molecules on the metal surface.

**Chapter 9:**
This chapter gives the details about the SEM. The smooth mild surface was seriously damaged by the corrosion when placed in 0.5M trichloroacetic acid for one hour immersion exposure. The surface shows inclusions and the surface roughness. The inhibitor molecules involve the interaction with reactive sites of the mild steel surface resulting in the decrease in the contact of the mild steel with the aggressive acid. The surface is more uniform in the inhibited solution than the surface in the absence of the inhibitor except some hallows structures.

In the last section of thesis, the mechanism of corrosion and its inhibition in presence of schiff bases as inhibitors is discussed.