**A Mini Project Report on**

**“Loss and efficiency analysis of the universal motor for the AC and DC voltage sources and controlling the speed of the universal motor”**

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**Abstract of Project:**

A universal motor is a special type of motor. This motor works on both AC and DC supply. In this project, the universal motor performance for AC and DC sources are compared. Loss and efficiency of the universal motor are calculated for both AC and DC sources. Speed of the universal motor is controlled using the tapped field winding method. The Differential equations of universal motor are solved by Euler's method and analysed using c programming. The matlab Simulink is used for getting torque speed characteristic of the universal motor and to exhibit the speed control of the motor using tapped field winding method.

**Research Objectives:**

1. To calculate the losses and efficiency of the universal motor for AC and DC voltage sources.
2. To control the speed of the universal motor by tapped field winding technique through mathematical modelling.
3. To obtain the solution for the universal motor equations using c programming with the help of Euler's method.
4. To simulate the universal motor for the AC and DC voltage sources through MATLAB Simulink and to obtain the torque v/s speed curves.

**Conclusion:**

We analysed the mathematical modelling of universal motor. The speed of universal motor can be controlled by tapped winding technique. The plotting results for both AC and DC are shown for variation of speed with flux and speed with torque. We have compared the efficiency for AC and DC supplies and we found DC is more efficient than AC. In the future scope, to improve the efficiency of the universal motor better algorithm can be developed for calculating iron losses with prominence on the rotor. In this paper, the high rotor field frequency and due to the eddy currents weakening of the magnetic field is not considered.