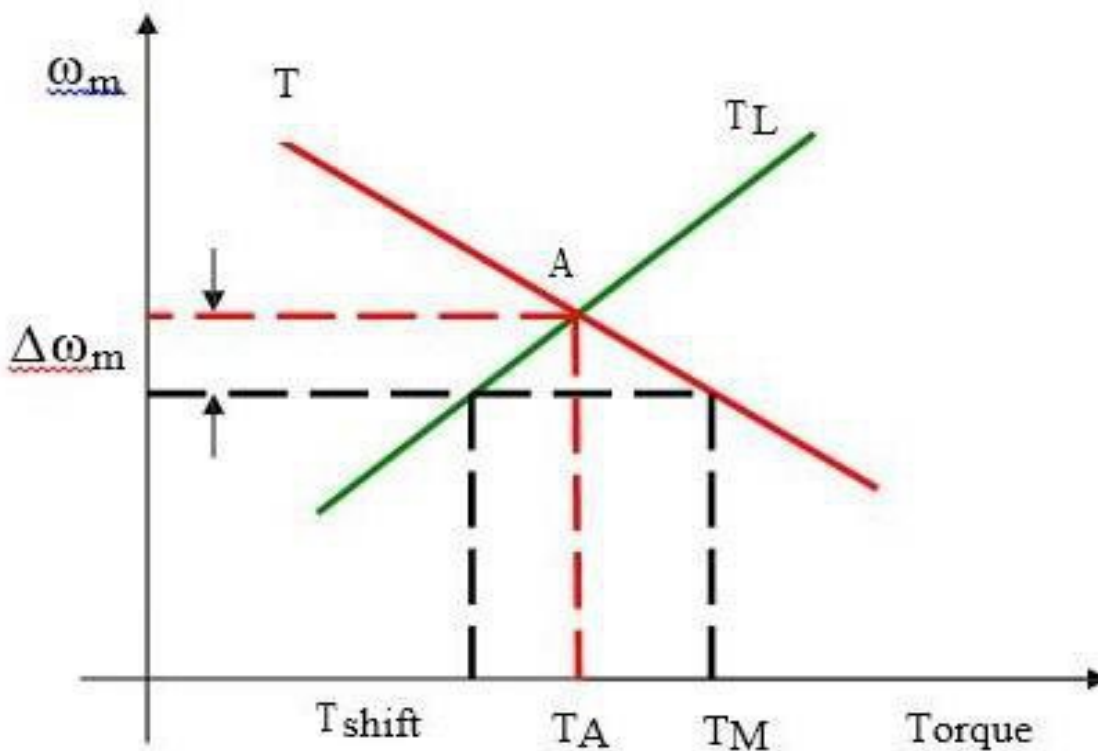## 1.3 Steady State Stability:

Equilibrium speed of motor-load system can be obtained when motor torque equals the load torque. Electric drive system will operate in steady state at this speed, provided it is the speed of stable state equilibrium.

Concept of steady state stability has been developed to readily evaluate the stability of an equilibrium point from the steady state speed torque curves of the motor and load system. In most of the electrical drives, the electrical time constant of the motor is negligible compared with the mechanical time constant. During transient condition, electrical motor can be assumed to be in electrical equilibrium implying that steady state speed torque curves are also applicable to the transient state operation. Now, consider the steady state equilibrium point A shown in figure below
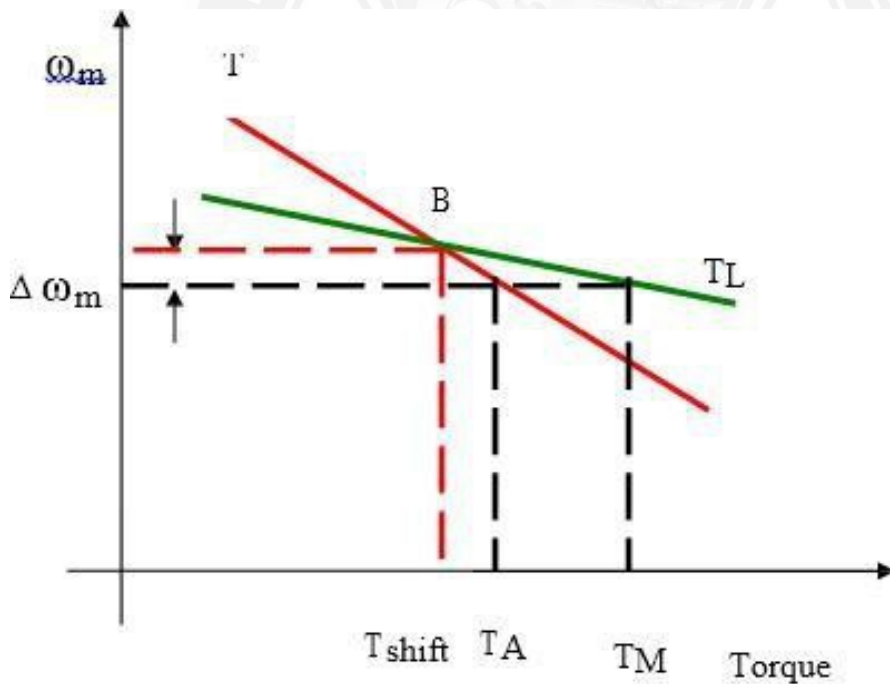

Figure 1.3.1 Steady state stability

(Source:"Fundamentals of Electrical Drives" by G.K.Dubey,page-23)

Now consider equilibrium point B which is obtained when the same motor drives another load as shown in the figure.

A decrease in speed causes the load torque to become greater than the motor torque, electric drive decelerates and operating point moves away from point B.

Similarly when working at point B and increase in speed will make motor torque greater than the load torque, which will move the operating point away from point B

Figure 1.3.1 Steady state equilibrium point

(Source:"Fundamentals of Electrical Drives" by G.K.Dubey,page-23)