ELECTRIC DRIVES
EE-701
Credit: 4
Contact: 3L+1T

Module 1
Electric Drive:
Concept, classification, parts and advantages of electrical dives. Types of Loads, Components of load toques, Fundamental torque equations, Equivalent value of drive parameters for loads with rotational and translational motion. Determination of moment of inertia, Steady state stability, Transient stability. Multi quadrant operation of drives. Load equalization. [05]

Module 2
Motor power rating:
Thermal model of motor for heating and cooling, classes of motor duty, determination of motor rating for continuous, short time and intermittent duty, equivalent current, torque and power methods of determination of rating for fluctuating and intermittent loads. Effect of load inertia & environmental factors. [05]

Module 3
Stating of Electric Drives:
Effect of starting on Power supply, motor and load. Methods of stating of electric motors. Acceleration time Energy relation during stating, methods to reduce the Energy loss during starting.

Braking of Electric Drives:
Types of braking, braking of DC motor, Induction motor and Synchronous motor, Energy loss during braking. [08]

Module 4
DC motor drives:
Modeling of DC motors**,** State space modeling, block diagram & Transfer function, Single phase, three phases fully controlled and half controlled DC drives. Dual converter control of DC drives. Power factor, supply harmonics and ripple in motor current chopper controlled DC motor drives. [06

Module 5
Induction motor drives:
Stator voltage variation by three phase controllers, Speed control using chopper resistance in the rotor circuit, slip power recovery scheme. Pulse width modulated inverter fed and current source inverter fed induction motor drive. Volts/Hertz Control, Vector or Field oriented control. [06]

Module 6
Synchronous motor drives:
Variable frequency control, Self Control, Voltage source inverter fed synchronous motor drive, Vector control. [05]

Module 7
Introduction to Solar and Battery Powered Drive, Stepper motor, Switched Reluctance motor drive
Industrial application:
Drive consideration for Textile mills, Steel rolling mills, Cement mills, Paper mills, Machine tools. Cranes & hoist drives. [05]

Numerical problems to be solved in tutorial classes.

Text Books:

1. Fundamental of Electrical Drives, G.K. Dubey, New Age International Publication.
2. Electric Drives, Vedam Subrahmanyam, TMH
3. A first course on Electrical Drives, S.K. Pillai, , New Age International Publication.

Reference Books:

1. Electric motor drives, R. Krishnan, PHI
2. Modern Power Electronics & Ac drives, B.K. Bose, Pearson Education.
3. Electric Motor & Drives. Austin Hughes, Newnes.