SUBJECT NO-EE60035, SUBJECT NAME- ELECTRIC DRIVE SYSTEMS

LTP- 3-1-0,CRD- 4

SYLLABUS :-

Course Name: Electric Drive SystemsCourse No.: EE60035L-T-P : 3-1-0Prerequisite: NoneIntroduction to Electric Drives – Need of electric drives, basic parts, present scenario of electric drivesMechanical Dynamics in an Electric Drive - Speed-torque characteristics of some common motors and loads, multiquadrant operation, equivalent values of drive parameters, stability of an electric drive General Block Diagram of a Closed Loop Drive System – Speed, torque and position controlSelection of Motor Power Rating – Thermal model of motor for heating and cooling, classes of motor duty, determination of motor ratingChopper Controlled DC Motor Drive – Different types of choppers and their quadrants of operations, PWM strategies for different choppers, chopper control of series DC motor.Power Semiconductor Switches Used in an Electric Drive System - Basic structure, V-I characteristics and switching characteristics of thyristors and IGBTs, gate drive and protection circuits of thyristors and IGBTs.DC Motor Drive Using Phase Controlled Rectifier – DC motor drive using half controlled and fully controlled single phase and three phase rectifiers, continuous and discontinuous conduction modes of operation, 4-quadrant operation using dual converter.Closed Loop Control of DC Motor - Operating limits of a separately excited DC motor drive, dynamic model of DC motor, dynamic model of chopper and phase controlled rectifier, design of single loop speed controller, cascaded controller design for DC motor using inner current control loop and outer speed control loop, field weakening operation.Voltage Source Inverter and its PWM strategies – Basic principles of voltage source inverter, 120o and 180o modes of operation, need for pulse width modulation, sine-triangle PWM, space-phasor based PWM, current controlled PWM.Induction Motor Drive – Steady state equivalent circuit and phasor diagram with variable frequency supply, v/f control and constant air gap flux control of induction motor drive, field weakening operation of induction motor drive.Synchronous Motor Drive – Synchronous motor drive with Variable Voltage Variable Frequency supply, synchronous motor drive using a voltage source inverter, synchronous motor drive using load commutated thyristor inverter, control of synchronous machine using cycloconverter.