



C. U. SHAH UNIVERSITY
Wadhwan City

FACULTY OF: - Technology & Engineering
DEPARTMENT OF: -Electrical Engineering
BRANCH: Electrical& Electronics Engineering
SEMESTER: - VIII
CODE: - 4TE08SSD1
NAME – Solid State Drives

Teaching & Evaluation Scheme

Subject Code	Name of the Subject	Teaching Scheme (Hours)				Credits	Evaluation Scheme							
		Th	Tu	Pr	Total		Theory				Practical (Marks)			Total
							Sessional Exam		University Exam		Internal		University	
							Marks	Hrs	Marks	Hrs	Pr/Viva	TW	Pr	
4TE08 SSD1	Solid State Drives	4	0	2	6	5	30	1.5	70	3	--	20	30	150

Objectives

- To identify various types of DC drives and AC drives used in the industries
- Understand the role of converters in the operation of DC drives and in continuous and discontinuous mode
- Study the role of choppers for the DC Voltage manipulation of Drives
- Study the Induction motor drive with the aspect of stator voltage control, stator frequency control and slip recovery scheme.
- Study the various aspects of synchronous motor drives

Prerequisites

- Fundamentals of Power Electronics and Electrical Machines.

Course Outlines

Sr. No.	Course Contents	Hours
1	Introduction: History of DC and AC Drive -Electronic Control -Solid State Control, State of art DC and AC Drive , Block Diagram of Drive - Part Of Electrical Drive	06
2	Converter Control: Principle of phase control – Fundamental relations, Analysis of series and separately excited DC motor with single-phase and three-phase converters – waveforms, performance parameters, performance characteristics, Continuous and discontinuous armature current operations, Current ripple and its effect on performance, Operation with freewheeling diode, Implementation of braking schemes, Four Quadrant operation of DC Drive-Drive employing dual	16

	converter- Advantage and Disadvantage of Dual Converter with & without Circulating Current	
3	Chopper Control : Chopper controlled DC motor performance analysis, multi-quadrant control, Chopper based implementation of braking schemes, Multi-phase chopper-Reversible Drive- Selection of Drive for speed reversal, Traction Drive using semiconductor converter controlled DC motors	10
4	Induction Motor drives Types of Induction Motor Control Stator Voltage Control Of Induction Motor: Torque slip characteristics, operation with different types of loads, closed loop control of Stator voltage through power electronics modulator Stator Frequency Control: Variable frequency operation, V/F control, controlled current and controlled slip operation, Effect of harmonics and control of harmonics, PWM inverter drives, Multiquadrant drives, closed loop control of stator frequency through Power Electronics Modulator Rotor Resistance Control: Slip - torque characteristics, rotor choppers, torque equations, constant torque operation, closed loop control of Rotor Resistance through Power Electronic Modulator Slip Power Recovery Scheme: Torque equation, torque slip characteristics, power factor, methods of improving power factor, limited sub synchronous speed operation, super synchronous speed operation, closed loop control of slip power recovery scheme.	16
5	Synchronous Motor Drives Speed control of synchronous motors, adjustable frequency operation of synchronous motors, principles of synchronous motor control , Voltage Source Inverter Drive with open loop control , self controlled synchronous motor with electronic commutation , self controlled synchronous motor drive using load commutated thyristor inverter. Principle of Vector control.	8

Learning Outcomes

- The Induction motor drives and DC drives are used in the industry. The implementation of such modern technology will help to increase the efficiency and reduce the losses in the drive requirement of the industries. The learning will help the students to identify the operational aspects, drive requirements for the installations and solve the power quality issues resulting the smooth operation process for the industry.

Books Recommended

1. “ModernPowerElectronicsandACDrives” by BKBose Tata
2. “PowerSemiconductorControlledDrives” by G.K.Dubey. PHI
3. “ElectricalMotorDrives” by ,R.Krishnan Oxford Publication
4. “Fundamentals of Electrical Drives”, GKDubey, PHI Publication
5. “Electrical Drives, 2nd ed” by S.A.Nasar, Boldea.

6. “Fundamentals of Electrical Drives” by M.A. El-Sharkawi PHI Publication.