

# GUJARAT TECHNOLOGICAL UNIVERSITY

## B. E. SEMESTER: VI

### Mechatronics Engineering

Subject Name: **Control of Electric Drives**

Subject Code: **162003**

Teaching Scheme				Evaluation Scheme		
Theory	Tutorial	Practical	Total	University Exam (Theory) (E)	Mid Sem Exam (Theory) (M)	Practical (I)
4	0	2	6	70	30	50

Sr. No	Course Content	Total Hrs.
1.	<b>Review of Principles of Mechanics:</b>  Newton's laws; moment of inertia; effect of gearing, power and energy.	5
2.	<b>Dynamics of A Mechanical Drive:</b>  Equation of motion of a drive with lumped inertia; steady state characteristics of different types of motors; stable and unstable operating points.	9
3.	<b>Integration of The Simplified Equation of Motion:</b>  Solution of linearised equation; numerical and graphical integration.	8
4.	<b>Separately Excited DC Machines:</b>  Differential equation and block diagram; armature control, field control and combined controls; field weakening.	7
5.	<b>Solid State Power Sources for DC Motor Control:</b>  Thyristor converters including dual converters; two quadrant and four quadrant choppers using MOSFETS, IGBTs & transistors.	10
6.	<b>Control of Special Machines:</b>  Introductory of Stepper motors; Servo motor control, Universal motor, control, Single phase ac motor control.	12

**Text Book:**

1. G K Dubey  
Fundamentals of Electric Drives  
Narosa Publication

**Reference Books:**

1. W. Leonard  
Control of Electric Drives,  
Narosa Publication.
2. Takashi Kenjo  
Power Electronics for the Microprocessor Age,  
Oxford.
3. M.Rashid.  
Power Electronics: circuits, devices and application,  
PHI.

**List of Experiments:**

1. Performance of Uncontrolled rectifiers.
2. Plot the static V-I characteristic of an SCR.
3. Performance of single phase half wave controlled rectifier for DC motor speed control
4. Performance of single-phase full wave controlled rectifier for DC motor speed control.
5. Performance of single quadrant step down chopper for DC motor speed control.
6. Performance of single-phase inverter.
7. Study and performance of the static V-I characteristic of an SCR.
8. Performance of single-phase AC voltage controller for speed control of AC motor connected with fan load.
9. Performance of stepper motor control.
10. To study different methods for starting of Induction motors.