

GUJARAT TECHNOLOGICAL UNIVERSITY

DIPLOMA IN POWER ELECTRONICS

SEMESTER: V

Subject Name: **Control System**

Sr. No.	Course Content
1.	Control Systems: <ul style="list-style-type: none"> • Control system: Role of control system in engineering, Definition, • Open loop control system, definition block diagram examples, • Closed loop control system, definition, block diagram examples, Comparison between open loop and closed loop control systems. • Servomechanism : definition, Speed control of motor circuit as servomechanism • Temperature control system as feedback control, Regulator as feedback control – definition, Voltage control of generator as example of regulator. • Applications of control system, Automatic machine tool control, Anti - Aircraft radar tracking system.
2.	Transfer Function: <ul style="list-style-type: none"> • Definition of Laplace transform, its advantages. • Transfer Function: Definition, Transfer function of electrical networks, Transfer function of R-C Network, R-C-R-C Network, R-L-C Network, Transfer function of a single transistor amplifier circuit, Transfer function of open loop control system and closed loop control system.
3.	Specifications of Systems and Time Response Analysis: <ul style="list-style-type: none"> • Various test signals used in control system: Step signal, Ramp signal, Parabolic signal, Impulse signal • Laplace transform and time response of test signals • Time domain specification – introduction, First order system and second order system, Step response of first order system, Step response of second order system, Definitions of second order system • Damping ratio, Damping constant, Undamped natural frequency.
4.	System Stability: <ul style="list-style-type: none"> • Stability: Need of stability in control system, Definition, Absolute and relative stability, Necessary conditions for stability.
5.	Control Components: <ul style="list-style-type: none"> • Potentiometers: Principle of potentiometer as error detector, Types of potentiometer, Linear potentiometer, Rotary movement potentiometer, Characteristics, Limitation of potentiometer • Synchros: Principle, Types of synchros, Construction, operation and working principles of Synchro transmitter, Synchro receiver, Synchro control transformer, Synchro differential transformer.

	<ul style="list-style-type: none"> • Synchro indicator system, Synchro error detector system, Applications of synchro • Servo amplifier: Special features of servo amplifier, Electronics amplifier, comparison • Servo Motor: Construction operation and characteristics of DC Servomotor, AC servomotor, two phase AC motor as AC servomotor, Comparison between AC servomotor and DC servomotor, Applications of servomotor • Tachometers: Characteristics of good tachometer, Construction and operation of AC tachometer, Application of tachometers • AC position control system: Its working / block diagram and working principle • DC position control system: Its circuit / block diagram and working principle
6.	<p>Types of Modern Control System:</p> <ul style="list-style-type: none"> • Proportion control system: Its introduction, working principle with example • Integral control system: Its introduction working principle and example • Derivative control system: Its introduction working principle and example • Proportional plus integral system • Proportional plus derivative system • Proportional plus integral plus derivative system with working principle and circuit Diagram. • Effect of proportional, integral and derivative control action on system performance

Reference Books:

1. Modern control engineering, PHI, K.Ogata.
2. Control system engineering, NEW AGE, J. J. Magrath, M.Gopal.
3. Control Engineering, PHI, M. N. Bandopadhyay.
4. Control system analysis and design, KHANNA, K.K.Agrawal.