

<b>SEMESTER</b> <i>Seventh</i>	<b>DEPARTMENT</b> <i>Telecommunications Engineering</i>	<b>COURSE TITLE</b> <i>Control Theory I</i>
<b>COURSE CODE</b> <i>EC505</i>	<b>HOURS</b> 3 <b>UNITS</b> 3	<b>COURSE SPECIFICATIONS</b> <i>Theoretical Content</i>
<b>1. Introduction to Control Systems:</b> <ul style="list-style-type: none"> <li>➤ Introduction to a control system and its components.</li> <li>➤ Open-loop and closed-loop systems.</li> <li>➤ Definition of the automatic control system.</li> <li>➤ Basic functions of control valves, electric motors, sensors and transducers in a control system.</li> </ul>		
<b>2. Transfer Function of Control Systems:</b> <ul style="list-style-type: none"> <li>➤ Mathematical foundation (Complex variables, function of complex variables, analytic of function, etc).</li> <li>➤ Laplace Transform.</li> <li>➤ Important theorem in Laplace transformation.</li> <li>➤ Inverse Laplace transformation.</li> <li>➤ Differential equations.</li> <li>➤ Transfer function concept.</li> </ul>		
<b>3. Block Diagrams and Signal Flow:</b> <ul style="list-style-type: none"> <li>➤ Typical elements of block diagram in control systems.</li> <li>➤ Block diagram reduction.</li> <li>➤ Signal flow graph.</li> <li>➤ Mason's rule.</li> </ul>		
<b>4. Stability of Linear Control Systems:</b> <ul style="list-style-type: none"> <li>➤ Characteristic equations.</li> <li>➤ Location of poles.</li> <li>➤ Routh Hurwitz Criterion.</li> </ul>		

**5. Modeling of Dynamic Systems:**

- Modeling of passive electrical elements
- Modeling of electrical networks.
- Modeling of active elements.
- Modeling of mechanical systems.
- DC motor in Control systems.

**6. Time- Domain Analysis in Control Systems:**

- Time response of first order control systems.
- Time response of second order control systems.
- Typical test signals for the time response of control systems.
- Steady state error.

**7. Root Locus:**

- Definition of Root Locus.
- Properties of Root Locus.
- Sketching Root Locus.
- Pole sensitivity.
- Root Locus compensations.

**8. Frequency Response:**

- Bode plots.
- Nyquist criterion.
- Stability via Nyquist diagrams.
- Gain margin and phase margin via Nyquist diagrams.

**References:**

1. *Modern Control Engineering*, K. Ogatta, Prentice Hall, 1994.
2. *Modern Control Systems*, R. C. Dorf, Eddison Wesley, 1990.