Control Systems Engineering

**BASIC CONTROL SYSTEM**
System differential equation of electrical, mechanical, thermal, hydraulic and electromechanical network, analogy

**THEORY OF AUTOMATIC CONTROL**
Concept of feedback referred to linear control systems in general, e.g. displacement and speed control, process control, definition and terminology, open loop and closed loop systems and its advantages.

2.1 Block diagrams and single flow graph representation of a physical system, block diagram algebra, transfer function from a block diagram. Basic control actions and controllers – on – off. Proportional, derivative and integral controllers, steady – state analysis.

04 2.2 Transient response of first order and second order systems to step, ramp and sinusoidal input, steady state errors, Applications of Laplace transform methods, Reuth’s stability criteria and root locus methods improving system performance

**HYDRAULIC SYSTEM**
Characteristic of hydraulic components control valves, sources of hydraulic power hydraulic meters, pistons and transmission, elements of circuit design, Accumulation control circuit such as position control and speed control circuit. 3.1 Hydraulic Systems: Reciprocating Pump, pressure intensifier, cranes, ram, press, lift, coupling and hydraulic controls. Maintenance of hydraulic system: Fire Foam resistance oxidation and corrosion of hydraulic pipe sealing devices, Filtersregulator, problems caused by gas in hydraulic circuit cooling of power pack

**PNEUMATIC SYSTEMS**
Pneumatic power supply, Amplifiers with different controlling actions, Pneumatic valves and cylinders, theory of four way and pilot valves.

**ELECTRICAL SYSTEMS**
Speed control of D.C. motors, Remote center positional serve mechanism (including effect of gearing between motor and load).
MICROPROCESSOR BASED DIGITAL CONTROL
State space analysis optional and adaptive control systems – Industrial logic control system – programmable logic controller and its applications.

FUZZY LOGIC
Concept of fuggy logic, basic notions, linguistic variables of fuggy control comparison of design methodology, examples and case study 7.1 Control Systems for mechanical engineering systems like thermal power plants, boiler, refrigeration plants, central air-conditioning plants and automobiles.

CONTROL COMPONENTS
Pneumatic relays, control mechanisms for liquid level, boiler feed control, pressure regulation, throttle valve, temperature regulations and industrial process regulation.

Books

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<tr>
<th>Book Title</th>
<th>Author</th>
<th>Publisher</th>
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<tr>
<td>Modern Control Engineering</td>
<td>Ogata K,</td>
<td>Pearson Education</td>
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<tr>
<td>Control Systems Engineering</td>
<td>Nagrath &amp; Gopal,</td>
<td>New Age International Publishers</td>
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<td>Automatic Control System</td>
<td>Kuo, Benjamin.C,</td>
<td>Prentice Hall</td>
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<td>Control Systems Engineering</td>
<td>Nise, Norman S</td>
<td>John wiley &amp; Sons, New York</td>
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<td>Control Systems Engineering</td>
<td>S K Bhattacharya,</td>
<td>Pearson Education</td>
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<tr>
<td>Control Engineering</td>
<td>D.Ganesh Rao, K. Chennavenkatesh</td>
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