



BIT359

DIGITAL INSTRUMENTATION & CONTROL

UNIT –I

Introduction to process control Introduction, control systems, process control block diagram, control system evaluation, time response, significance and statistics. Analog signal conditioning. principles of analog signal conditioning, passive circuits, op amps, op-amps in instrumentation, Industrial Electronics.

Digital Signal Conditioning: Review of digital fundamentals, comparators, DACs ADCs Data Acquisition Systems (DAS).

UNIT – II

Thermal Sensors: Metal resistance Vs temperature devices, thermistors, thermocouples, bimetal strips, Gas thermometer, vapor pressure thermometer, liquid expansion thermometer, solid state temperature sensors.

Mechanical Sensors displacement, location or position sensors, strain sensors, motion sensors, pressure sensors, flow sensors.

UNIT –III

Optical Sensors : Fundamentals of EM radiation, photo detectors, pyrometry, optical sources, applications.

Final control : Final Control operation, signal conversions, actuators, control elements.

UNIT – IV

Discrete–state process control : Definition , characteristics of the system, ladder diagram, Programmable logic controllers.

Controller principles : Process characteristics, control system parameters, discontinuous, continuous and composite controller modes.

UNIT – V

Analog controllers: Electronic controllers, pneumatic controllers, design considerations. Digital Controllers Digital electronics methods, computers in process control, characteristics of digital data, controller software.

Control loop characteristics: Control system configurations, multivariable control systems, control system quality, stability, process loop tuning.

Suggested Reading:

1. Curtis Johnson, Process Control Instrumentation Technology , Eighth Edition, PHI-2006.
2. W Bolton , Mechatronics, Electronic Control Systems in Mechanical and Electrical Engineering, Second Edition, Pearson Education, Asia, 2001.
3. CS Rangan, G.R. Sarma, V.S.V Mani, Instrumentatin Devices & Systems, Second Edition, Tata McGraw Hill, 2002.