COURSE TITLE   **: INDUSTRIAL AUTOMATION**
COURSE CODE   **: 6036**
COURSE CATEGORY   **: E**
PERIODS/WEEK   **: 4**
PERIODS/SEMESTER   **: 60**
CREDITS   **: 4**

TIME SCHEDULE

MODULE	TOPICS	PERIODS
1	Automation & Control System	15
2	Control System Components	15
3	Electrical Actuators & Controllers	15
4	Modern control systems	15
Total		**60**

Course Outcome:

Sl.	Sub	**On completion of this course the student will be able:**
1	1	To understand the need of automation
	2	To know the different components of automated system.
2	1	To understand the control system components.
3	1	To Understand working of Electrical Actuators and Controllers
4	1	To understand the modern control systems.
	2	To understand the applications of SCADA ,DCS,PLC

Specific Outcome:

MODULE I: Automation & Control System

    1.1.1   To describe the Automation.
    1.1.2   To state need of automation.
    1.1.3   To discuss the advantages of automation.
    1.1.4   To explain the requirements of automation.

1.2.1   To explain the concept of control system.
1.2.2   To explain the open loop-closed loop control system.
1.2.3   To draw basic block diagram of control system.
1.2.4.   To state the different terms in control system.
1.2.5.   To explain applications of control system.
1.2.6   To develop the block diagram for simple control applications.

MODULE II: Control System Components

1.1.1   To describe the different types of contacts.
1.1.2   To describe   current capacity & load utilization categories.
1.1.3   To discuss various types of DC, AC solenoids.
1.1.4   To explain various input devices.
1.1.5   To explain different output devices- contactors, valves, pilot lamps
1.1.6   To draw symbols in power & control circuits.
1.1.7   To develop a basic control circuit using above components.
1.1.8   To describe power & control circuit for different applications.

MODULE III: Electrical Actuators & Controllers

3.1.1.   To explain potentiometers working as an error detector.
3.1.2.   To describe the working principle of AC servomotor.
3.1.3   To describe the working principle of DC servomotors.
3.1.4   To explain synchros - transmitter, control transformer.
3.1.5   To describe the working of stepper motor-PM , variable reluctance & Tacho-generator.
3.1.6   To state applications of various components as AC/DC control system.
3.1.7   To explain the functions of control valves
3.1.8   To describe the working of Pneumatic control elements.
3.1.9   To explain the functions electrical controllers.
3.1.10   To explain the functions   Electronic controllers.
3.1.11   To explain digital controllers.

MODULE IV: Modern control systems

4.1.1   To explain various control actions.
4.1.2   To explain P+I+D action of pneumatic and electronic controller.
4.1.3   To describe the special control systems.

4.2.1   To explain hardware & software used in Distributed Control System (DCS)
4.2.2   To describe hardware & software used in SCADA.
4.2.4   To discuss smart instruments in RTU
4.2.5   To explain high speed counter.

CONTENTS

MODULE I

Automation-need of automation-advantages of automation-requirements of automation, control System, concept of control system, basic block diagram of control system, different terms in control system.Types of control system, Applications of control system, Development of block diagram for simple applications like level, temperature, flow control

MODULE II

Control System components - contacts-types, current capacity & load utilization categories, solenoids-dc/ ac, I/P devices- switches-push buttons, foot switch, selector switch, pilot switch, proximity, photoelectric, temperature actuated, level control, pressure sensing, overload sensing, Relays-electromechanical, reed O/P devices- contactors, valves, pilot lamps, symbols in power & control circuits, Developing control circuit-basic & thumb rule, Power & control circuit for different applications like hoist, crane, conveyer belt, induction motors

MODULE III

Potentiometers-working & use as error detector, servomotors-AC & DC –working principle, synchros - transmitter, control transformer, use of as error detector, stepper motor-pm & variable reluctance-working principle. Tacho- generator, applications of above components as AC/DC control system, control valves, components like accumulator, filter, seals, pneumatic-resistance & capacitance of pressure system, pneumatic flapper-nozzle system, pneumatic relays, actuating valves, cylinders, electrical & electronic controller, digital controllers-brief overview of microprocessor & microcontroller to be worked as controller.

MODULE IV

Control actions-On-Off, P, I, P+I, P+D,P+I+D actions, P+I+D action using pneumatic, electronic controller, Introduction to special control systems, Distributed Control System(DCS)-brief introduction to hardware & software used. SCADA- brief introduction to hardware & software used-principles of modern SCADA-harware –software-land lines for SCADA-local area network- modem in SCADA system -smart instruments in RTU-PLC-classification-analog-digital I/O modules-specification of a typical PLC,HSC.

REFERENCE BOOKS

1. I J Nagrath & Madan Gopal. Control System Engineering: Wiley Eastern
2. Louis C. Westpha. Handbook of Control Systems Engineering: Kluwer academic publishers.
3. Andrew Parr. Hydraulics & Pneumatics: Jaico Publications.
4. S.K. Bhattachrya & Brijinder Singh. Control of Electrical Machines: New Age International Publisher.
5. David bailey ,Edwin wright. Practiucal scada for industry: Newness press