GUJARAT TECHNOLOGICAL UNIVERSITY

DIPLOMA IN INSTRUMENTATION & CONTROL

Semester: 4

Subject Name CONTROL SYSTEM COMPONENTS

Sr.No	Course content
1.	**CONTROL VALVE, VALVE ACTUATOR,VALVE POSITIONER** 1.1 Definitions : Valve Body, Capacity(C_v), Trim, Plug, Seat, Stem, Rangibility, Characteristics, Leakage, Differential Pressure (Delta Pressure), Normally Open, Normally Closed. 1.2 Special valves like, 1.2.1 Globe valve – Single port valve , Double port valve , 1.2.2 Angle valve 1.2.3. Ball valve 1.2.4 Butterfly valve 1.2.5. Saunders patterns valve (Pinch valve) 1.2.6. Solenoid valve 1.2.7. Check valve 1.3 Valve Actuators : Pneumatic, Electro pneumatic, Hydraulic and Electric Actuators. 1.4 Valve Positioners : Pneumatic , Electro- pneumatic and Motorized.
2.	**CHARACTERISTICS OF CONTROL VALVE** 2.1 Characteristics of control valve :- quick opening, linear and equal percentage. (With graphs and shape of valve plugs)
3.	**CONTROL VALVE SELECTION** 3.1. Proper sizing. 3.2. Flow characteristics. 3.3. Piping forces. 3.4. Seismic forces. 3.5. Excessive pressure. 3.6. Temperature effect.
4.	**VALVE NOISE** 4.1 Human Ear and Sound. 4.2 Sound and Noise. 4.3 Valve Noise 4.3.1 Mechanical Noise. 4.3.2 Hydro dynamic noise. 4.3.3. Aero dynamic noise. 4.4. Removal of valve noise, 4.4.1. Source treatment. 4.4.2. Path treatment.

5.	**POTENTIOMETERS** 5.1. Construction of linear and rotary type Potentiometer. 5.2. Potentiometer as a position indicator. 5.3. Potentiometer as an error detector.
6.	**SYNCHROS** 6.1. Construction. 6.2. Types of Synchro. Principle and working. 6.3. Synchro pair as an error detector.
7.	**TACHOGENERATORS** 7.1 Principle and working, position & speed control with feedback through tacho-generator.
8.	**D.C. & A.C. SERVOMOTORS** 8.1 Circuit diagram, working for armature control and field control, torque speed characteristics of D.C. Servomotor. 8.2 A.C. Servomotor – schematic diagram and working of A.C. Servomotor in control system.
9.	**STEPPER MOTOR** 9.1 Types, Construction and applications.
10.	**GYROSCOPE** 10.1 Type, principle of operation and construction of Gyroscope. Definition of terms like Pitch, Roll and Yaw.

Reference Books:

1. Applied Instrumentation in Process Industry Vol I - W. G. ANDREWS
2. Instruments Engineers Handbook Vol II - B. G. LIPTAK
3. Mechanical and Industrial Measurements – R. K. JAIN
4. Control System Components GIBSON & TUTOR.
5. Control System Engineering H. M. RAI.
6. Control System Components B. CHATTERGEE
7. Servomechanism Practice AHRENDT & SAVANT