

GUJARAT TECHNOLOGICAL UNIVERSITY
B. E. SEMESTER: VI
Mechatronics Engineering

Subject Name: **Hydraulic & Pneumatic Systems**

Sr. No	Course Content	Total Hrs.
1.	Introduction : Introduction, Global fluid power Scenario, Basic system of Hydraulics—Major advantages and disadvantages, Principles of Hydraulic Fluid power, Hydraulic Symbols	2
2.	Hydraulic Oils ,Fluid Properties and Filter: Types, Properties, physical characteristics & functions of hydraulic Oils, ISO Viscosity grades, Classification- Mineral based, Fire resistant& Bio-degradable Oils, Filters, Contaminations, Filter rating, location of filter.	5
3.	Hydraulic Pumps & Motors: Classification of hydraulic pumps, Gear Pumps, Vane Pumps, Piston Pumps, Axial piston pumps, Hydraulic motors.	6
4.	Hydraulic Valves: Direction control valves, Pressure control valves, Flow control valves, Non-return valves.	5
5.	Hydraulic Actuators: Linear and Rotary Actuators, Hydrostatic Transmission Systems.	3
6.	Hydraulic system Accessories: Reservoirs, Accumulators, Heating & cooling devices, Pipes fittings, Hoses.	3
7.	Design of hydraulic circuits: Basic hydraulic circuits, Industrial hydraulic circuits, Power losses in flow control circuits.	6
8.	Introduction to Pneumatics: Basic Requirements for Pneumatic System, Applications	2
9.	Air Compressor and Pipeline Layout: Types & Selection criteria for Air Compressors, Air receiver, Pipeline Layout.	3

10.	Service Unit: Air filter, Pressure regulator and Lubricator (FRL unit)	2
11.	Pneumatic Cylinders and Motors: Types of Pneumatic Cylinders & Air motors, Cushion assembly, mounting arrangements	3
12.	Pneumatic Valves: Pneumatic Direction control valves, Quick exhaust, Time delay Shuttle, Twin pressure valves	3
13.	Pneumatic circuits: Basic pneumatic circuits, Development of single Actuator Circuits, Development of multiple Actuator Circuits, Conventional method, Cascade method	4
14.	Automation:	3

Text Books:

1. S R Majumdar
Oil Hydraulic Systems
Tata McGraw-Hill
2. S R Majumdar
Pneumatic Systems
Tata McGraw-Hill

References Books:

1. John Pippenger & Taylor Hicks
Industrial Hydraulics
McGraw-Hill
2. Anthony Esposito
Fluid Power
Prentice Hall
3. Andrew Parr
Hydraulics & Pneumatics
Jaico Publications

List of Experiments:

- (1) Graphical Symbol as per DIN-ISO: 1219
- (2) To understand working and construction of hydraulic components and basic circuits with using of Basic Hydraulic Software by Bosch web trainer.
- (3) To understand working and construction of pneumatic components and basic circuits with using of Basic Pneumatic Software by Bosch web trainer.
- (4A) To control Double acting pneumatic cylinder through 5/2 D.C. Valve
- (4B) To control Double acting pneumatic cylinder by 3/2 push button valves and Shuttle valve
- (5A) To understand use of Logic element 'OR' gate and 'AND' gate
- (5B) To understand use of Quick Exhaust & Flow control valve.
- (6A) To illustrate the use of Time Delay valve with 'OR' gate and 'AND' gate
- (6B) To illustrate pneumatic circuit involving two cylinders.
- (7A) Speed control of Hydraulic cylinder through Throttle valve.
- (7B) Speed control of Hydraulic cylinder through The Flow control valve in Bypass.
- (7C) Flow control valve in Meter-in & Meter-out circuit.
- (8) Electro Hydraulic circuit –Speed and Pressure control of double acting cylinder
- (9) Electro Hydraulic circuit—Sequential operation of double acting cylinder through Limit switches.
- (10A) To control double acting cylinder through 5/2 solenoid operated D.C. valve and PLC controller.
- (10B) To control double acting cylinder through 5/2 solenoid operated D.C. valve and PLC controller