

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**M.E. SEMESTER-II**  
**MECHATRONICS ENGINEERING**

Subject Name: **Advance Oil Hydraulic and Pneumatic Systems**  
Subject Code: **1724701**

| Sr. No. | Topics                                                                                                                                                                                                                                                                 | Hours |
|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| 1       | Introduction : Hydraulics<br>Basics of Hydraulics, Major advantages and disadvantages, Comparison of systems, ISO Symbols for fluid power elements.                                                                                                                    | 2     |
| 2       | Hydraulic Fluids ,Fluid Properties and Filter:<br>Types, Properties, physical characteristics of hydraulic Oils, ISO Viscosity grades, Classification- Mineral based, Fire resistant& Bio-degradable Oils, Filters, Contaminations, Filter rating, location of filter. | 4     |
| 3       | Hydraulic Pumps & Motors:<br>Classification of hydraulic pumps, Gear Pumps, Vane Pumps, Radial piston Pumps, Axial piston Pumps, Selection and sizing of Hydraulic Pumps ,Hydraulic motors.                                                                            | 6     |
| 4       | Hydraulic Valves:<br>Direction control valves, Pressure control valves, Flow control valves, Non-return valves, Proportional valves, Electro-Hydraulic Servo valves,                                                                                                   | 5     |
| 5       | Hydraulic Actuators:<br>Linear and Rotary Actuators, Hydrostatic Transmission Systems.                                                                                                                                                                                 | 3     |
| 6       | Hydraulic system Accessories:<br>Reservoirs, Accumulators, Heating & cooling devices, Pipes, Hoses, and fittings.                                                                                                                                                      | 3     |
| 7       | Design of hydraulic circuits:<br>Basic hydraulic circuits, Industrial hydraulic circuits, Power losses in flow control circuits.                                                                                                                                       | 5     |
| 8       | Introduction: Pneumatics:<br>Basic Requirements for Pneumatic System, Applications                                                                                                                                                                                     | 2     |
| 9       | Air Compressor and Pipeline Layout:<br>Types & Selection criteria for Air Compressors, Air receiver, Pipeline Layout.                                                                                                                                                  | 3     |
| 10      | Service Unit:<br>FRL unit, Air filter, Pressure regulator and Lubricator and Pressure Gauge.                                                                                                                                                                           | 2     |
| 11      | Pneumatic Cylinders and Motors:<br>Types of Pneumatic Cylinders & Air motors, Cushion assembly, mounting arrangements                                                                                                                                                  | 3     |
| 12      | Pneumatic Valves:<br>Pneumatic Direction control valves, Speed Regulators, Quick exhaust, Time                                                                                                                                                                         | 3     |

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|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
|    | delay Shuttle, Twin pressure valves                                                                                                                                                                 |   |
| 13 | Pneumatic circuits:<br>Basic pneumatic circuits, Development of single Actuator Circuits, Development of multiple Actuator Circuits, Conventional method, Cascade method, Karnaugh- Veitch diagram. | 4 |
| 14 | Electro-Pneumatics:<br>Overview and applications, System components, Development of single and multiple Actuator Circuits.                                                                          | 3 |
| 15 | Trouble shooting in Fluid Power:<br>Trouble shooting Oil Hydraulics, Trouble shooting Pneumatics                                                                                                    | 2 |

### **Text books**

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

### **Reference books**

1. John Pippenger & Taylor Hicks  
Industrial Hydraulics & Pneumatics  
McGraw-Hill
2. Anthony Esposito  
Fluid Power  
Pearson Education Pvt. Ltd.
3. Andrew Parr  
Hydraulics & Pneumatics  
Jaico Publishing House.
4. S. Ilango & Soundararajan  
Introduction To Hydraulics & pneumatics  
Second edition  
PHI Learning private Limited