# DESIGN OF FLUID POWER SYSTEMS

**Course Code: 15ME2114**

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**Course Outcomes:** At the end of the course, the student will be able to

**CO1:** Summarize the working of hydraulic systems and pumps
**CO2:** Explain working of hydraulic valves, cylinders and motors
**CO3:** Design the hydraulic and pneumatic circuits for a given application and execute the same in industry
**CO4:** Identify the maintenance and trouble shooting of fluid power systems in industry
**CO5:** Outline the advanced electrical controls in fluid power systems

**UNIT-I** (10-Lectures)

Introduction to hydraulic systems and ancillary hydraulic systems: Introduction to hydraulic systems, design and construction of hydraulic reservoir and sizing, gravity type, spring-loaded and gas loaded type accumulators.

Hydraulic pumps: Gear pumps, vane pumps and piston pumps, sizing of hydraulic pumps, selection of hydraulic pumps.

**UNIT-II** (10-Lectures)

Hydraulic control valves: direction control valves, pressure control valves, flow control valves, servo valves

Hydraulic cylinders and motors: hydraulic cylinder operation and cylinder mountings - hydraulic cylinder design and cushions, hydraulic motors - gear, vane and piston motors – hydraulic motor theoretical torque, power and flow rate - hydraulic motor performance - hydrostatic transmissions.

**UNIT-III** (10-Lectures)

Hydraulic circuit design and analysis: Control of single and double acting cylinders, regenerative and pump unloading circuit, hydraulic cylinder sequence and synchronizing circuits, speed control of

hydraulic cylinder and motor, hydraulic motor breaking system.

**UNIT-IV** (10-Lectures)

Pneumatics: Basic requirements for pneumatic system – air compressor– pneumatic cylinders and air motors – pneumatic valves - basic pneumatic circuits.

Maintenance and trouble shooting of hydraulic and pneumatic systems: oxidation and corrosion of hydraulic fluids - maintaining and disposing of fluids - wear of moving parts due to solid particle contamination of the fluid - problems caused by gases in hydraulic fluids - troubleshooting of hydraulic system - maintenance and troubleshooting of pneumatic systems.

**UNIT – V** (10-Lectures)

Electrical controls in fluid power systems: Basic electrical devices – electrical components, electrical controls in pneumatic systems, examples of simple electro-pneumatic circuits with solenoid operated direction control valve for the control of single and double-acting cylinders.

**TEXT BOOKS:**

1. Anthony Esposito, "*Fluid Power with Applications*" Sixth Edition, Pearson Education, Inc. New Delhi, 2003.
2. S.R.Majumdar, "*Pneumatic Systems – Principles and Maintenance*", Tata McGraw Hill Publishing Company Limited, New Delhi, 1995.

**REFERENCES:**

1. S.R.Majumdar, "*Oil Hydraulic Systems – Principles and Maintenance*", Tata McGraw Hill Publishing Company Limited, New Delhi, 2012.
2. Andrew Parr, "*Hydraulics and Pneumatics – A Technician's and Engineer's Guide*", Nineth Jaico Impression, Jaico Publishing House, Mumbai, 2005
3. www.pneumatics.com
4. www.fluidpower.com.tw