



Department Of Mechanical Engineering
Fluid Power Systems Syllabus

ME4109PE: Fluid Power Systems
B.Tech. IV Year I Sem.

L/T/P/ 3/0/0/3

UNIT- I

Introduction to oil hydraulics and pneumatics, their structure, advantages and limitations. ISO symbols, energy losses in hydraulic systems. Applications, Basic types and constructions of Hydraulic pumps and motors. Pump and motor analysis. Performance curves and parameters.

UNIT- II Hydraulic actuators, types and constructional details, lever systems, control elements – direction, pressure and flow control valves. Valve configurations, General valve analysis, valve lap, flow forces and lateral forces on spool valves. Series and parallel pressure compensation flow control valves. Flapper valve Analysis and Design.

UNIT- III Proportional control valves and servo valves. Nonlinearities in control systems (backlash, hysteresis, dead band and friction nonlinearities). Design and analysis of typical hydraulic circuits. Regenerative circuits, high low circuits, Synchronization circuits, and accumulator sizing.

UNIT- IV Intensifier circuits Meter-in, Meter-out and Bleed-off circuits; Fail Safe and Counter balancing circuits, accessories used in fluid power system, Filtration systems and maintenance of system. Components of pneumatic systems; Direction, flow and pressure control valves in pneumatic systems. Development of single and multiple actuator circuits. Valves for logic functions; Time delay valve; Exhaust and supply air throttling;

UNIT- V Examples of typical circuits using Displacement – Time and Travel-Step diagrams. Will-dependent control, Travel-dependent control and Time dependent control, combined control, Program Control, Electro pneumatic control and air-hydraulic control, Ladder diagrams. Applications in Assembly, Feeding, Metal working, materials handling and plastics working.

TEXT BOOKS:

1. Fluid Power Control systems/ Pippenger, J.J., and R. M. Koff/ New York: McGraw Hill.
2. “Fluid Power Systems: modeling, simulation and microcomputer control”/ John Watton/

Prentice Hall International.

REFERENCE BOOKS:

1. Fundamentals of Fluid Power Control. / John Watton/ 1 st Ed. Cambridge University Press,2009

2. “Fluid Power with applications”/ Anthony Esposito / Pearson Education.