FLUID POWER SYSTEM
(Professional Elective - V)

	L	T/P/D	C
B.Tech. IV Year II Sem.			
Course Code: **ME852PE**	**3**	**0/0/0**	**3**

Pre-requisites: Fluid Mechanics and Hydraulics Machinery

Course outcomes: After doing this, student should be able to

- Understand the Properties of fluids, Fluids for hydraulic systems,
- governing laws. distribution of fluid power, Design and analysis of typical hydraulic circuits.
- Know accessories used in fluid power system, Filtration systems and
- maintenance of system.

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. Performan 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, Electropneumatic control and air-hydraulic control, Ladder diagrams. Applications in Assembly, Feeding, Metalworking, materials handling and plastics working.

TEXT BOOKS:

1. John Watton: Fundamentals of Fluid Power Control. 1 st Ed. Cambridge University Press, 2009
2. Blackburn, J. F.,G.Reethof, and J. L.Shearer, Fluid Power Control, New York: Technology Press of M. I.T. and Wiley.
3. Anthony Esposito,"Fluid Power with applications", Pearson Education.
4. Ernst, W., Oil Hydraulic Power and its Industrial Applications, New York: McGraw Hill.
5. Lewis,E.E., and H.Stern, Design of Hydraulic Control Systems, New York: McGraw Hill.
6. Morse,A. C., Electro hydraulic Servomechanism, New York: McGraw Hill.
7. Pippenger, J.J., and R. M. Koff, Fluid Power Control systems, New York: McGraw Hill.
8. Fitch, Jr., E.C., Fluid Power Control Systems, New York: McGraw Hill.
9. Khaimovitch, "Hydraulic and Pneumatic Control of Machine Tools"
10. John Watton, "Fluid Power Systems: modeling, simulation and microcomputer control", Prentice Hall International.
11. Herbert E. Merritt: Hydraulic control systems, John Wiley and Sons Inc.

REFERENCES:

1. Ian Mencal, Hydraulic operation and control of Machine tools Ronald Press
2. Sterwart Hydraulic and Pneumatic power for production-Industrial Press.
3. Hasebrink J.P., and Kobler R., "Fundamentals of Pneumatics/electropeumatics", FESTO Didactic publication No. 7301, Esslingen Germany, 1979.
4. Werner Deppert and Kurt Stoll, "Pneumatic Control-An introduction to the principles", Vogel-Verlag.
5. Blaine W. Andersen, "The analysis and Design of Pneumatic Systems", John Wiley