

Course Description & Objective:

To acquaint and equip with the latest developments in the field of hydraulics and pneumatics with special reference to the usage of these on the modern day tractors.

Course outcomes:

Upon completion of this chapter, the student should be able to:

- 1. explain the meaning of fluid power.*
- 2. list the various applications of fluid power.*
- 3. differentiate between fluid power and transport systems.*
- 4. list the advantages and disadvantages of fluid power.*
- 5. explain the industrial applications of fluid power.*
- 6. list the basic components of the fluid power.*
- 7. list the basic components of the pneumatic systems.*
- 8. differentiate between electrical, pneumatic and fluid power systems.*
- 9. appreciate the future of fluid power in india.*

UNIT I

Fluid power, its advantages, properties of hydraulic fluids, viscosity, bulk modulus, density. Concepts of energy of hydraulic systems, laws of fluid flow.

UNIT II

Distribution system, pressure rating of tubing and hoses, couplings. Basics of hydraulic flow and hydraulic circuit analysis – pumps, types and theory of operation. Pressure intensifiers.

UNIT III

Fluid power actuators, hydraulic rams, gear motors, piston motors and their performance characteristics, electrohydraulic motors and hydrostatic transmissions, control components.

UNIT IV

Directional pressure safety and servo valves. Hydraulic circuit design. Regenerative pump unloading, pressure intensifier circuits. Speed control of hydraulic motors, mechanical hydraulic servo systems for tractors.

UNIT V

Pneumatic circuits – properties of air. Compressors, control elements. Design of pneumatic circuits. Electrical control for fluid power circuits. Electronic sensors/ circuits used as controls in modern farm equipment. Maintenance of hydraulic and pneumatic circuits and devices. Troubleshooting.

Practicals:

1. Study of properties of hydraulic fluids.
2. Design problems on hydraulic pumps.
3. Design problems on hydraulic pumps.
4. Design problems on hydraulic motors.
5. Design problems on hydraulic motors.

6. Design problems on hydraulic cylinders.
7. Study of hydraulic circuits.
8. Design of hydrostatic transmission.
9. Study of hydraulic valves.
10. Design of pneumatic circuits.

Suggested Readings

1. Anthony Esposito. 2003. *Fluid Power with Applications*. Pearson's Edu.
2. Krutz G. 1984. *Design of Agricultural Machines*. John Wiley & Sons.
3. Merritt HE. 1991. *Hydraulic Control System*. John Wiley & Sons.
4. Majumdar SR. 2003. *Oil Hydraulic System*. Tata McGraw Hill.