

IV Year I - Semester

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AG407 Hydraulic Drive & Controls

Course Description & Objectives:

To expose the student to the fluids properties, hydraulic, pumps, valve and services used in agricultural machinery

Course Outcomes:

At the completion of the course the student will have:

1. knowledge and skills on, hydraulic, pumps used in machinery.
2. knowledge on different kinds of valves.
3. skills on trouble shooting in valves.
4. knowledge on safety features and service requirements of various hydraulic and pneumatic circuits.

Unit 1: Introduction to Hydraulic:

Hydraulic Basics: Pascal's Law, Flow, Energy, Work, and Power. Hydraulic Systems, Colour Coding, Reservoirs, Strainers and Filters, Filtering Material and Elements.

Unit II: Introduction to Pumps and Gauges:

Accumulators, Pressure Gauges and Volume Meters, Hydraulic Circuit, Fittings and Connectors. Pumps, Pump Classifications, Performance, Displacement, Designs, Gear Pumps, Vane Pumps, Piston Pumps, Pump Operation.

Unit III: Introduction to Valve:

Hydraulic Actuators, Cylinders, Construction and Applications, Maintenance, Hydraulic Motors. Valves, Pressure Control Valves, Directional Control Valves, Flow Control Valves, Valve Installation, Valve Failures and Remedies,

Unit IV: Troubleshooting of Valve:

Valve Assembly, Troubleshooting Valves Hydraulic Circuit Diagrams and Troubleshooting, United States of American Standards Institute USASI Graphical Symbols Tractor hydraulics, nudging system, ADDC.

Unit V: Safety and Services:

Pneumatics: Air services, logic units, Fail safe and safety systems Robotics: Use of Hydraulics and Pneumatics drives in agricultural systems, PLCs(Programmable Logic Controls).

TEXT BOOKS:

1. Ernst, W.(1960) *Oil Hydraulic Power and its Industrial applications*. New York: McGraw Hill.
2. Ian Mencil.(2003). *Hydraulic operation and control of machine tools*. Ronald Press.

REFERENCES:

1. John Watton (1989).. *Fluid Power Systems: modelling, simulation and micro computer control*. Prentice Hall International.
2. Khaimovitch. (2004). *Hydraulic and Pneumatic control of Machine Tools*.
3. Lewis, E.E., and H. Stern. (1962). *Design of Hydraulic Control Systems*. NewYork; Mc Graw Hill.
4. Pippenger, J.J., and R.M. Koff. (1959).*Fluid Power control systems*. New York: McGraw Hill.
5. Sterwart. (1977). *Hydraulic and Pneumatic power for production*. Industrial Press.
6. Thoma Jean U. (1964).*Hydrostatic Power Transmission*. Trade and Technical Press, Surrey, England.
7. Werner(1975). Deppert and Kurt Stoll. *Pneumatic control An introduction totheprinciples*. Vogel Verlag.
8. Anthony Esposito.(2008). *Fluid Power with applications*. Pearson Education.
9. Blackburn, J.F., G. Reethof and J.L. Shearer. (1960). *Fluid Power Control*. NewYork, Technology Press of M.I.T. and Wiley.
- 10 .Blaine W. Andersen.(1966). *The analysis and design of pneumatic systems*. John Wiley and Sons, Inc
11. Fitch, Jr., E.C. (1966).*Fluid Power Control Systems*. Mc Graw Hill, New York.