

## IAGE - 312

### Applied Hydraulics and Pneumatics

(02 credits – 50 marks)

#### Course Outcomes:

On completion of the Course, students should be able to

1	Recall the basic concepts of in hydraulic systems and fluidics and hydropneumatics
2	Describe function of hydraulic system, servo systems, torque motors, Bistable flip flop, turbulence amplifier, Pneumatic controls,
3	Illustrate area of applications of a Hydraulic transmission, fluidics and pneumatic circuit
4	Analyze the designing aspects of hydraulic system and pneumatic system
5	Discriminate hydropneumatics, hydraulic and hydropneumatic system, Types of transmission
6	Design and construct rehydraulic circuit with servo valve, hydraulic circuit with proportional valve, pneumatic sequencing circuit, pneumatic circuit with quick exhaust valve, pneumatic circuit with time delay valve, pneumatic speed control circuit, Hydraulic regenerative circuit

#### **Course Contents:**

##### **Module-I : Hydraulic Servo Techniques and Hydrokinetics**

(07 HRS)

Overview of function of hydraulic system, Mechanical feedback and application of tracer valve, Feedback in the system, Electro-hydraulic servo systems, Torque Motors, Types of Servo valves, Special valve features, Terminologies in servo technology. Types of transmission, pump-motor combination, Applications of Hydraulic transmission

##### **Module-II : Design of Hydraulic Systems**

(06 HRS)

Hydraulic circuits, Manual and automatic hydraulic systems, Regenerative ckt., use of check valves, selection of pump, Circuit Diagram standards, basic circuits functional diagram, application of functional diagram, electrical control of hydraulic systems

##### **Module-III : Fluidics and Hydropneumatics**

(07 HRS)

Introduction to fluidics, Bistable flip flop, turbulence amplifier, low pressure, pneumatics sensors, application of fluidics/ low pressure pneumatics as sensors proportional devices, Hydropneumatics systems, hydraulic check Modules, hydropneumatic cylinder , parallel check Module, integral air-oil, cylinder, types of feed, intensities, comparison of hydropneumatics, hydraulic and hydropneumatic system.

**Module-IV : Automation and Principle of Pneumatic circuit design**

(07 HRS)

Pneumatic controls, Functional diagram in pneumatic circuit design, Movement diagram, Cascade system in pneumatic circuit design, Logics in pneumatic circuit design, Logics and Boolean algebra. Demorgan's theorem of inversion. Examples of control equation , use of K-V map for pneumatic circuit design, K-V diagram, Control problem

**Module-V :** Tutorials, assignments and presentation based on Module I to IV

**References:**

1. S. R. Majumdar – Oil Hydraulic Systems: Principles and Maintenance, Tata McGraw Hill Education Pvt. Ltd., ISBN – 0-07-463-748-7
2. W. Bolton – Pneumatic and Hydraulic Systems, Butterworth Heinemann, ISBN – 0-07-506-383-62
3. A. Parr – Hydraulics and Pneumatics: A Technician's and Engineer's Guide, Butterworth Heinemann, ISBN – 0-08-096-674-8
4. S R Majumdar; 2006 (Sixteenth Reprint); Pneumatic Systems (Principal and maintenance); Tata McGraw - Hill Publishing Company Limited; ISBN 0-07-460231-
5. P. Joji; 2008; Pneumatic Controls; Willey India Pvt. Ltd., ISBN 978-81-265-1542-4
6. Antony Barber; 1997 (Eighth Ed.); Pneumatic Handbook; Elsevier Science Ltd.; ISBN 978-81-265
7. Andrew Parr; 2011 (Third Ed.); Hydraulics and Pneumatics-A Technician's and Engineer's Guide; Elsevier Ltd. (Butterworth-Heinemann); ISBN-13: 978-0-08-0966748