

# AMME20 HYDRAULICS AND PNEUMATICS

## UNIT-1 FLUID POWER PRINCIPLES AND HYDRAULIC PUMPS 9

- 1.1 Introduction to Fluid power- Advantages and Applications- Fluid power systems
- 1.2 Types of fluids Properties of fluids- Basics of Hydraulics
- 1.3 Pascal's Law- Principles of flow- Friction loss- Work, Power and Torque.
- 1.4 Problems Sources of Hydraulic power: Pumping Theory- Pump Classification Construction,
- 1.5 Working, Design, Advantages, Disadvantages, Performance,
- 1.6 Selection criterion of Linear, Rotary- Fixed and Variable displacement pumps-Problems

## UNIT-2 HYDRAULIC ACTUATORS AND VALVES

- 2.1 Hydraulic Actuators: Cylinders- Types and construction, Application, Hydraulic cushioning
- 2.2 Hydraulic motors Control Components: Direction control, Flow control and Pressure control valves- Types, Construction and Operation- Servo and Proportional valves
- 2.3 Applications- Types of actuation. Accessories: Reservoirs, Pressure Switches- Applications- Fluid Power ANSI Symbols- Problems

## UNIT-3 HYDRAULIC SYSTEMS

- 3.1 Accumulators, Intensifiers, Industrial hydraulic circuits
- 3.2 Regenerative, Pump Unloading, Double-pump, Pressure Intensifier, Air-over oil, Sequence,
- 3.3 Reciprocation, Synchronization, Fail-safe, Speed control, Hydrostatic transmission,
- 3.4 Electro hydraulic circuits, Mechanical Hydraulic servo systems.

## UNIT-4 PNEUMATIC SYSTEMS

- 4.1 Properties of air- Perfect Gas Laws- Compressors- Filter, Regulator, Lubricator, Muffler,
- 4.2 Air control Valves, Quick Exhaust valves, Pneumatic actuators,
- 4.3 Design of pneumatic circuit cascade method Electro pneumatic circuits,
- 4.4 Introduction to Fluidics, Pneumatic logic circuits.

## UNIT-5 TROUBLE SHOOTING AND APPLICATIONS

- 5.1 Installation, Selection, Maintenance, Trouble Shooting and Remedies in Hydraulic and Pneumatic systems.
- 5.2 Design of hydraulic circuits for Drilling, Planning, Shaping, Surface grinding, Press and Forklift applications.
- 5.3 Design of Pneumatic circuits for a Pick and Place application and tool handling in a CNC machine. Low cost Automation- Hydraulic and Pneumatic power packs- case studies.

### References Books:

1. Shanmugasundaram.K, "Hydraulic and Pneumatic Controls", Chand & Co, 2006.
2. Majumdar, S.R., "Oil Hydraulics Systems- Principles and Maintenance", Tata McGraw Hill, 2001
3. Dudelyt, A Pease and John J Pippenger, "Basic Fluid Power", Prentice Hall, 1987.