Gautam Buddha University; Greater Noida

School of Engineering (Mechanical Engineering)

Degree	Course Name	Course Code	Marks:100
M. Tech. in Design Engg.	Design of Hydraulic and Pneumatic Systems	MED 511	SM+MT+ET 25+25+50
Semester	**Credits**	**L-T-P**	**Exam.**
I	3	3-0-0	3 Hours

Unit – I

Fluid Power Systems and Fundamentals: Introduction to fluid power; Advantages of fluid power; Application of fluid power system. Types of fluid power systems; Properties of hydraulic fluids – General types of fluids – Fluid power symbols. Basics of Hydraulics-Applications of Pascals Law-Laminar and Turbulent flow – Reynold's number – Darcy's equation – Losses in pipe; Valves and fittings. **(08 Hours)**

Unit – II

Hydraulic System & Components: Sources of Hydraulic Power: Pumping theory – Pump classification – Gear pump; Vane Pump; Piston pump; Construction and working of pumps – pump performance – Variable displacement pumps. Fluid Power Actuators: Linear hydraulic actuators – Types of hydraulic cylinders – Single acting; Double acting special cylinders like tanden; Rodless; Telescopic; Cushioning mechanism; Construction of double acting cylinder; Rotary actuators – Fluid motors; Gear; Vane and Piston motors. **(09 Hours)**

Unit – III

Design of Hydraulic Circuits: Construction of Control Components : Directional control valve – 3/2 way valve – 4/2 way valve – Shuttle valve – check valve – pressure control valve – pressure reducing valve; Sequence valve; Flow control valve – Fixed and adjustable; Electrical control solenoid valves; Relays; Ladder diagram. Accumulators and Intensifiers: Types of accumulators – Accumulators circuits; Sizing of accumulators; Intensifier – Applications of Intensifier – Intensifier circuit. **(08 Hours)**

Unit – IV

Pneumatic Systems and Components: Pneumatic Components: Properties of air – Compressors – Filter; Regulator; Lubricator Unit – Air control valves; Quick exhaust valves; Pneumatic actuators. Fluid Power Circuit Design; Speed control circuits; synchronizing circuit; Penumo hydraulic circuit; Sequential circuit design for simple applications using cascade method. **(07 Hours)**

Unit – V

Servo Systems: Servo systems – Hydro Mechanical servo systems; Electro hydraulic servo systems and proportional valves. Fluidics – Introduction to fluidic devices; Simple circuits. **(06 Hours)**

Unit – VI

Design of Pneumatic Circuits: Introduction to Electro Hydraulic Pneumatic logic circuits; Ladder diagrams; PLC applications fluid power control. Fluid power circuits; Failure and troubleshooting. **(07 Hours)**

Recommended Books:

1. Hydraulic and Pneumatic controls; R. Srinivasan; Vijay Nicole; 2006.
2. Hydraulic and Pneumatic controls; K. Shanmugasundaram Chand & Co; 2006.
3. Pneumatic systems – Principles and maintenance; S. R. Majumdar; Tata McGraw Hill; 1995
4. Oil hydraulics in the service of industry; Anthony Lal; Allied Publishers; 1982.
5. Practical guide to fluid power; L. Harry and D. B. Stevart; Taraoeala sons and Port Ltd. Broadey; 1976.
6. Basic Fluid Power; Dudelyt A. Pease and John T. Pippenger; Prentice Hall; 1987.