

Maulana Abul Kalam Azad University of Technology, West Bengal*(Formerly West Bengal University of Technology)***SYLLABUS FOR BACHELOR OF TECHNOLOGY IN MECHANICAL ENGINEERING
(Effective from academic session 2018-19)**

Subject Code: D	Category: Professional Elective Courses
Subject Name : Fluid Power Control	Semester: Sixth
L-T-P: 3-0-0	Credit: 3
Pre-Requisites: Fluid Mechanics and Fluid Machinery	

Course Objective:

1. To know the basics of different types of fluid power control systems and their applications.
2. understand working principles of different components of a pneumatic or hydraulic system.

Course Content:

Module No.	Description of Topic	Contact Hrs.
1	Fluid power; Applications and advantages; Components of a hydraulic and pneumatic system. Desired properties of a hydraulic fluid; advantage of mineral oil over water; definition of terms like pressure, head, force, density, specific gravity, kinematic and absolute viscosity, compressibility and incompressibility. Pascal's law; analysis of simple hydraulic jack, Mechanical advantage; continuity equation; hydraulic power of a cylinder.	5
2	Hydraulic Pumps: positive displacement pumps; constructional features, working principle and volumetric capacity of external gear pump, vane pump, axial piston pump and radial piston pump.	6
3	Hydraulic Actuators : Constructional features of single acting and double acting hydraulic cylinders; mounting of cylinders, cushioning of cylinder; different application of cylinder through mechanical linkages; force, velocity and power from a cylinder. Hydraulic motors; torque, power and flow rate in a hydraulic motor.	4
4	Hydraulic Valves: Direction control valves – operation and graphical symbol of 3 way and 4 way valves; different modes of activation of valves. Operation and graphical symbols of check valves, pressure relief valve pressure reducing valve, unloading valve and flow control valve.	4
5	Representation of hydraulic components through ANSI symbols. Analysis of hydraulic circuits for single and double acting cylinder control, regenerative circuit, pump unloading circuit, double pump hydraulic system, cylinder synchronization circuit, speed control of a hydraulic motor, circuit to lift and hold heavy load, automatic sequencing of two cylinders.	7

6	Advantages & disadvantages of pneumatic system compared to hydraulic system; constructional details and operation of a reciprocating compressor; working principle and use of filter, pressure regulator, lubricator and silencer; symbols of different pneumatic components; compressed air distribution system in a plant; drawing pneumatic circuits for different operations.	6
7	Use of electrical devices for controlling fluid circuits; function of electrical devices like push-button switches, limit switches, pressure switches, solenoids, relays and timers and their symbols; concept of ladder diagram; study of circuits using electrical control devices such as control of a solenoid actuated cylinder using one limit switch, reciprocation of a cylinder using pressure or limit switches, and two cylinder sequencing circuit using two limit switches.	4

Course Outcomes:

After completing this course, the students will

1. know about different types of fluid power control systems and their applications.
2. learn working principles of different components of a pneumatic and hydraulic system.
3. learn about drawing fluid power control circuits to suit an application.

Learning Resources:

1. S. Ilango and V. Soundararajan, Introduction to Hydraulics and Pneumatics, PHI, 2011.
2. A. Esposito, Fluid Power with Applications, Pearson, 2003.
3. S.R. Majumdar, Pneumatic Systems: Principles and Maintenance, McGraw Hill, 1999.
4. E.C. Fitch Jr., Fluid Power and Control Systems, McGraw Hill, New York, 1966.
5. D.S. Banks and D.D. Banks, Industrial Hydraulics, Prentice Hall, 1988.