COURSE CODE	APPLIED HYDRAULICS AND PNEUMATICS	L	T	P	C
1152ME102		3	0	0	3

1. Preamble

This course provides adequate knowledge in hydraulics and pneumatics circuits and their role in manufacturing industries. It also introduces PLC and its applications.

2. Prerequisite

1 Basic Electrical Engineering 1150EE101
2 Basic Electronic Engineering 1150EC101

3. Links to other courses

1 Industrial Robotics 1154ME106
2 Mechatronics system 1151ME109

4. Course Educational Objectives

Students undergoing this course are expected:

- To understand the fundamentals of fluid power transmission systems
- To design various hydraulic and pneumatic system components.

5. Course Outcomes

Upon the successful completion of the course, learners will be able to

CO Nos.	Course Outcomes	Level of learning domain (Based on revised Bloom's)
CO1	Correlate the basics of hydraulics to the performance of fluid power systems.	K2
CO2	Describe the working principle of hydraulic systems including pumps and control components.	K3
CO3	Understand the working principle of pneumatic systems and their components.	K2
CO4	Understand and Design various types of hydraulic and pneumatic power circuits.	K3
CO5	Understand and design various types of applications in fluid power circuits.	K3

(K3 - Apply)

6. Correlation of CO's with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	H	L	L									L	M	L
CO2	H	L	L									L	M	L
CO3	H	L	L									L	M	L
CO4	H	L	L									L	M	L
CO5	H	L	L									L	M	L

H- High; M-Medium; L-Low

7. Course Contents

UNIT I FLUID POWER SYSTEMS AND FUNDAMENTALS **L-9**

Introduction to fluid power, Advantages of fluid power, Application of fluid power system. Types of fluid power systems, General types of fluids – Properties of hydraulic fluids –Fluid power symbols. Basics of Hydraulics-Applications of Pascal's Law

UNIT II HYDRAULIC SYSTEM COMPONENTS **L-9**

Sources of Hydraulic Power: Pumping theory – Pump classification –construction and working of pumps – Variable displacement pumps, pump performance. Actuators: Linear hydraulic actuators– Single acting and double acting cylinders, Rotary actuators – Fluid motors.

Control Components: Direction control valve – Valve terminology - Various center positions. Shuttle valve – check valve – pressure control valve – pressure reducing valve, sequence valve. Flow control valves – Fixed and adjustable. Safety valves

UNIT III PNEUMATIC SYSTEM COMPONENTS **L-9**

Pneumatic Components: Properties of air. Compressors. FRL Unit – Air control valves, Quick exhaust valves and pneumatic actuators- cylinders, air motors. Basics of low cost automation

UNIT IV FLUIDICS &PNEUMATIC CIRCUIT DESIGN **L-9**

Fluidics – Introduction to fluidic devices, simple circuits Introduction to Electro Hydraulic Pneumatic logic circuits, PLC applications in fluid power control, Sequential circuit design for simple applications using classic, cascade, step counter, logic with Karnaugh- Veitch Mapping and combinational circuit design methods.

UNIT V FLUID POWER CIRCUITS **L-9**

Speed control circuits, synchronizing circuit, Pneumo hydraulic circuit, Accumulators and Intensifiers-Accumulator circuits, Intensifier circuits. Servo systems – Hydro Mechanical servo systems, Electro hydraulic servo systems and proportional valves.

Deceleration circuit, hydrostatics transmission circuits, control circuits for reciprocating drives in machine tools, Material handling equipments. Fluid power circuits; failure and troubleshooting.

TOTAL: 45 periods

8. Text Books

1. Majumdar S.R., "Pneumatic systems – Principles and maintenance", Tata McGraw Hill, 2008
2. Anthony Esposito, "Fluid Power with Applications", Pearson Education 2009.

9. References

1. Majumdar S.R., "Oil Hydraulics", Tata McGraw-Hill, 2000.
2. Harry L. Stevart D.B, "Practical guide to fluid power", Taraoeala sons and Port Ltd.Broadey, 2010.
3. Michael J, Prinches and Ashby J. G, "Power Hydraulics", Prentice Hall, 2011.
4. Dudelyt, A. Pease and John T. Pippenger, "Basic Fluid Power", Prentice Hall, 2011.