

<b>COURSE TITLE</b>	<b>OIL HYDRAULICS AND PNEUMATICS</b>
<b>COURSE CODE</b>	<b>01CA1212</b>
<b>COURSE CREDITS</b>	<b>3</b>

**Objective:**

- 1 A revolutionary change has taken place in the field of fluid power technology. An engineer in the field of design may require knowledge of power transmission; or in the field of operation and maintenance needs to know the power transmission system of different machine tools and equipment. An engineer should be well acquainted with various selection and manufacturing techniques, control, procedure and application of hydraulic/pneumatic components

**Course Outcomes:** After completion of this course, student will be able to:

- 1 Apply the principles of oil hydraulics and pneumatics to evaluate the suitability of different power transmission systems for engineering applications.
- 2 Analyze the properties of hydraulic fluids filtration systems, and hydraulic components to ensure reliable operation of hydraulic systems.
- 3 Design basic hydraulic and pneumatic circuits using appropriate components such as pumps, compressors, valves, actuators and accessories for specific industrial applications.
- 4 Design electro-hydraulic and electro-pneumatic control circuits for automated fluid power systems and industrial applications.

**Pre-requisite of course:**NIL

**Teaching and Examination Scheme**

<b>Theory Hours</b>	<b>Tutorial Hours</b>	<b>Practical Hours</b>	<b>ESE</b>	<b>IA</b>	<b>CSE</b>	<b>Viva</b>	<b>Term Work</b>
3	0	0	50	30	20	0	0

<b>Contents : Unit</b>	<b>Topics</b>	<b>Contact Hours</b>
1	<b>Introduction:</b> Fundamentals of oil hydraulics and pneumatics; Functional requirements of a power transmission and their comparisons based on different criteria of various power transmission systems like mechanical, electrical, oil hydraulic and pneumatic, Advantages, disadvantages and Applications of Oil Hydraulic and Pneumatic power transmissions	2
2	<b>Hydraulic Oils, Fluid Properties and Filter</b> Types, Properties, functions of hydraulic Oils, ISO Viscosity grades, Classification, Mineral based, Fire resistant & Biodegradable Oils, Filters, Contaminations, Filter rating, location of filter	4

<b>Contents : Unit</b>	<b>Topics</b>	<b>Contact Hours</b>
3	<b>Hydraulic components, accessories and design of hydraulic circuit</b> Classification of hydraulic pumps, Gear Pumps, Vane Pumps, Radial piston Pumps, Axial piston Pumps, Selection of Hydraulic Pumps, Direction control valves, Pressure control valves, Flow control valves, Non-return valves, Linear and Rotary Actuators,, Hydrostatic Transmission Systems, Reservoirs, Accumulators, Heating & cooling devices, Basic hydraulic circuits, Industrial hydraulic circuits, Power losses in flow control circuits.	12
4	<b>Introduction to Pneumatic systems</b> Air Compressor, Service Unit, pneumatic , actuators and Pneumatic valves, Basic Requirements for Pneumatic System, Applications, Air Compressors, Air receiver, FRL unit, Air filter, Pressure regulator and Lubricator, Types of Pneumatic Cylinders & Air motors, Cushion assembly, Pneumatic Direction control valves, Flow control valve, Quick exhaust, Time delay, Shuttle and Twin pressure valves	12
5	<b>Pneumatic circuits</b> Basic pneumatic circuits with single acting and double acting actuators, Basic pneumatic circuits with single acting and double acting actuators, Basic pneumatic circuits with single acting and double acting actuators, Basic pneumatic circuits with single acting and double acting actuators, multiple actuator circuits, sequential operation circuit	6
6	<b>Electro-Pneumatics and Electro Hydraulics, PLC</b> Overview and applications, System components, Development of single and multiple Actuator Circuits, Development of single and multiple Actuator Circuits, Introduction and programming of PLC, Introduction and programming of PLC	6
<b>Total Hours</b>		<b>42</b>

**Textbook :**

- 1 Oil Hydraulic Systems , S R Majumdar, Tata McGraw-Hill , 2003
- 2 Pneumatic systems, S R Majumdar , Tata McGraw Hill, 2003

**References:**

- 1 Industrial Hydraulics , Industrial Hydraulics , John Pippenger & Taylor Hicks , McGraw-Hill , 2023
- 2 Fluid Power, Fluid Power, Anthony Esposito, Prentice Hall , 2013
- 3 Hydraulics & Pneumatics, Hydraulics & Pneumatics, Andrew Parr, Jaico Publications, 2015
- 4 Pneumatic and Hydraulic Systems, Pneumatic and Hydraulic Systems, Hiranya singh, IR Publication, 2016
- 5 Introduction to hydraulics and pneumatics, Introduction to hydraulics and pneumatics, S Ilango, PHI, 2011

**Suggested Theory Distribution:**

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking / Creative
15.00	20.00	20.00	15.00	15.00	10.00

**Instructional Method:**

- 1 To give knowledge to students about hydraulics and pneumatics use of videos, case studies and examples are taken

**Supplementary Resources:**

- 1 <https://help.scilab.org/link>