

LOK JAGRUTI UNIVERSITY (LJU)
INSTITUTE OF ENGINEERING AND TECHNOLOGY

Department of Mechanical Engineering
Bachelor of Engineering (B.E.) – Semester - VI

Course Code:	017105601
Course Name:	Oil Hydraulics and Pneumatics
Category of Course:	Open Elective Course (OEC-1)
Prerequisite Course:	Physics (017101192), Conventional Machining Processes (017103302), Manufacturing Technology (017103401) , Fluid Mechanics (017103491)

Teaching Scheme				
Lecture (L)	Tutorial (T)	Practical (P)	Credit	Total Hours
4	0	0	4	40

Syllabus				
Unit No.	Topic	Prerequisite topic	Successive topic	Teaching Hours
01	Introduction			4 (10%)
	1.1 Types of power transmission systems (Mechanical/Electrical/Fluid)	Fluid properties(017103491-Unit-01)	---	
	1.2 Introduction to fluid power and application of hydraulic and pneumatic system		---	
	1.3 Difference between hydraulics and pneumatics	Types of power transmission systems (M-006-Unit 1.1)	---	
	1.4 Comparison hydraulic and pneumatic system with mechanical and electrical system		---	
	1.5 Types of fluid-properties (Mineral based, Fire resistant& Biodegradable Oils) and selection	Fluid properties(017103491-Unit-01)	---	
02	Hydraulics			3 (6.5%)
	2.1 Laws of hydraulics(Pascal and Brahma's Law)	Derive pascal's law for pressure at a point & apply for vertical, horizontal & inclined element. (017103491-Unit-02)	---	
	2.2 General layout of hydraulic system along with symbol	---	---	
	2.3 Components of hydraulic system (Cylinder,DCV,FCV,PCV,Pump,Reservoir,Hose/Pipe)	---	---	
	2.4 Filters-types (Surface,Edge,Depth,Bypass,Full flow,Proportional) and location(inline,Pressure line,Return line,offline)	---	---	
03	Hydraulic Pumps			4 (10%)
	3.1 Classification of hydraulic pumps		---	
	3.2 Gear pumps(Internal,External,Gerotor,Screw), vane pumps(Balanced,Unbalanced)	---	---	
	3.3 Piston pumps (Inline,bentaxis)and non-positive displacement pump(Centrifugal,Axial)	---	---	
	3.4 Selection criteria for pump	---	---	
04	Hydraulic Cylinders And Motors			4 (10%)
	4.1 Hydraulic motors(Gear,vane,Piston)	---	---	
	4.2 Hydraulic actuators(Single acting,Double acting,Telescopic)	---	---	
	4.3 Selection criterion of actuators	---	---	
	4.4 Cushion assembly	---	---	
	4.5 Cylinder mounting arrangement	---	---	
05	Control Valves			6 (17%)
	5.1 Classification of control valves (DCV,PCV,FCV)	---	---	
	5.2 Direction control valves along with symbols (Check valve,2/2,3/2,4/2,4/3,5/2,5/3)	---	---	
	5.3 Pressure control valves along with symbols(relief valve,reducing valve,unloading valve,counter balance valve,sequence valve)	Pressure gauges and bourdon tube (017101192-Unit-10)	---	
	5.4 Flow control valves along with symbols (Fixed restriction,variable restriction,FCV with reverse free flow,cam operated FCV, pressure compensated,Temperature compensated)	---	---	
	5.5 Operating methods of valves	---	---	
	5.6 Special type valve: quick exhaust valve, time delay valve and twin pressure valve	---	---	
	5.7 Solenoid operated valves and accumulator-principle and its types(weight loaded,Spring loaded,gas loaded)	---	---	
06	Pneumatics			4 (10%)
	6.1 Principle of pneumatics	Introduction to fluid power and application of hydraulic and pneumatic system(M-006-Unit 1.2)	---	
	6.2 General layout of pneumatic system	---	---	

1	Identify and analyze the functional requirements of a power transmission system for a given application. (Application involving fluid power transmission)
2	Design an appropriate hydraulic or pneumatic circuit or combination circuit like electro-hydraulics, electro-pneumatics for a given application. Develop a circuit diagram.
3	Visualize how the hydraulic/pneumatic circuit will work to accomplish the function considering Selection and sizing of components of the circuit.
4	Design and simulation of circuit in software.
Suggested Reference Books	
1	Oil Hydraulic Systems, Principle and Maintenance By S R Majumdar, Mcgraw-Hill.
2	Basic Pneumatic Systems, Principle and Maintenance By S R Majumdar, Mcgraw-Hill.
3	Fluid Power With Applications By Anthony Esposito, Pearson.
4	Fluid Power: Generation, Transmission and Control, Jagadeesha T., Thammaiah Gowda, Wiley.
5	The Analysis & Design Of Pneumatic Systems By B. W. anderson, John Wiley.
6	Control Of Fluid Power Analysis and Design By Mc Clay Donaldson, Ellis Horwood Ltd.
7	Industrial Hydraulics By John Pippenger and Tyler Hicks, Mcgraw Hill.
8	Hydraulic and Pneumatic Controls: Understanding Made Easy, K.Shanmuga Sundaram, S.Chand & Co Book Publishers, New Delhi, 2006 (Reprint 2009)

List of Open Source Software/Learning website	
1	Autosim Premium
2	Hydrosym
3	Automation Studio
4	http://nptel.ac.in/