## LOK JAGRUTI UNIVERSITY (LJU)

## **INSTITUTE OF ENGINEERING AND TECHNOLOGY**

## **Department of Mechanical Engineering**

## **Bachelor of Engineering (B.E.) – Semester - VI**

Course Code:	017105601	Teaching Scheme				
Course Name:	Oil Hydraulics and Pneumatics	Lecture (L)	Tutorial (T)	Practical (P)	Credit	Total Hours
Category of Course:	Open Elective Course (OEC-1)					
Prerequisite Course:	Physics (017101192), Conventional Machining Processes (017103302), Manufacturing Technology (017103401), Fluid Mechanics (017103491)	4	0	0	4	40

	Syllabus				
Unit No.	Торіс	Prerequisite topic	Successive topic	Teachin g Hours	
	Introduction				
01	1.1 Types of power transmission systems (Mechanical/Electrical/Eluid)	Fluid properties(017103401			
	1.2 Introduction to fluid power and application of hydraulic and	Unit-01)			
	pneumatic system			- (10%)	
	1.3 Difference between hydraulics and pneumatics	Types of power transmission		-	
	electrical system	systems (M-006-Unit 1.1)			
	1.5 Types of fluid-properties (Mineral based, Fire resistant& Biodegradable Oils) and selection	Fluid properties(017103491- Unit-01)			
	Hydraulics				
		Derive pascal's law for pressure			
	2.1 Laws of hydraulics( Pascal and Brahma's Law)	at a point & apply for vertical,		3 (6.5%)	
02		(017103491-Unit-02)			
02	2.2 General layout of hydraulic system along with symbol				
	2.3 Components of hydraulic system (Cylinder DCV ECV PCV Pump Peservoir Hose/Pipe)				
	2.4 Filters-types (Surface.Edge,Depth,Bypass,Full flow,Proportional)			-	
	and location(inline,Pressure line,Return line,offline)				
	Hydraulic Pumps				
	3.1 Classification of hydraulic pumps				
03	3.2 Gear pumps(Internal,External,Gerotor,Screw), vane pumps(Balanced Unbalanced)			4 (10%)	
	3.3 Piston pumps (Inline, bentaxis) and non-positive displacement				
	pump(Centrifugal,Axial)			_	
	3.4 Selection criteria for pump				
	Hydraulic Cylinders And Motors			-	
	4.1 Hydraulic motors(Gear, vane, Piston)			- 4	
04	4.3 Selection criterion of actuators			(10%)	
	4.4 Cushion assembly				
	4.5 Cylinder mounting arrangement				
	Control Valves				
	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	Pressure gauges and bourdon		-	
	valve,unloading valve,counter balance valve,sequence valve)	tube (017101192-Unit-10)		6	
05	5.4 Flow control valves along with symbols (Fixed restriction, variable restriction ECV with reverse free flow cam operated ECV pressure			(17%)	
	compensated, Temperature compensated)				
	5.5 Operating methods of valves				
	5.6 Special type valve: quick exhaust valve, time delay valve and twin				
	5.7 Solenoid operated valves and accumulator-principle and its			-	
	types(weight loaded,Spring loaded,gas loaded)				
	Pneumatics				
06	6.1 Principle of pneumatics	Introduction to fluid power and		4	
		application of hydraulic and pneumatic system(M 006 Unit		(10%)	
		1.2)			
	6.2 General layout of pneumatic system				

	6.3 Types of compressor (Reciprocating and Rotary) and selection of	Pressure gauges and bourdon			
	compressor	tube (017101192-Unit-10)			
	6.4 Filter, regulator and lubricator (FRL) and muffler				
	6.5 Service unit				
	Circuit Design				
07	7.1 Hydraulic and pneumatic circuit difference	General layout of hydraulic system(M-006-Unit 2.2),General layout of pneumatic system(M-		- 4 (10%)	
	7.2 Different combination of valves and development of circuit				
	7.3 Direct and indirect control				
	7.4 Development of multiple actuator circuits and cascade method for	006-Unit 6.2)			
	sequencing				
	Industrial Circuit Application				
	8.1 Lathe machine	Working Principle of Lathe			
		Machine (017103302-Unit-03)			
	8.2 Shaper machine	Mechanism of Shaper, Planar		4	
08		and Slotter Machines		4	
00	8.2 Milling machine	(01/105502-0111-07) Working Principle of Milling			
	8.5 Withing machine	Machine and Milling Methods			
11		(017103302-Unit-06)			
	8.4 Drilling machine	Working Principle of Drilling			
		Machine (017103302-Unit-05)			
	Basic Circuit Application				
	9.1 Hydrostatic transmission	General layout of hydraulic			
		system(M-006-Unit 2.2),General			
		layout of pneumatic system(M-			
		006-unit 6.2)		4	
09	9.2 Intensifier circuit			(10%)	
	9.3 Time delay circuit	Special type valve: quick			
		exhaust valve, time delay valve			
		Unit-5 7)			
	9.4 Furnace operation	Types of Furnaces (017103401-			
		Unit-04)			
Automation					
	10.1 Introduction to automation in hydraulics and pneumatics			3	
10	10.2 Fault finding condition monitoring			(6.5%)	
	10.3 Types of Software (Autosim, Hydrosym, Automation Studio) for				
	hydraulics and pneumatics systems				

Proposed Theory + Practical Evaluation Scheme by Academicians (% Weightage Category Wise and it's Marks Distribution)					
L :	4	T:	0	<b>P:</b>	0
Note: In Theory Group, Total 4 Test (T1+T2+T3+T4) will be conducted for each subject. Each Test will be of 25 Marks. Each Test Syllabus Weightage: Range should be 20% - 30%					
Group (Theory or Practical)	Group (Theory or Practical) Credit	Total Subject Credit	Category	% Weightage	Marks Weightage
Theory			MCQ	60%	60
Theory	4		Theory Descriptive (Mainly Programming)	40%	40
Theory			Formulas and Derivation	0%	0
Theory			Numerical	0%	0
Expected Theory %	100%	4	Calculated Theory %	100%	100
Practical			Individual Project	0%	0
Practical			Group Project	0%	0
Practical	0		Internal Practical Evaluation (IPE)	0%	0
Practical			Viva	0%	0
Practical			Seminar	0%	0
Expected Practical %	00%		Calculated Practical %	0%	0
Overall %	100%			100%	100

Course Outcome		
Upon completion of the course students will be able to		

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