

MOHAMMED SATHAK A J COLLEGE OF ENGINEERING

Siruseri IT park, OMR, Chennai - 603103

LESSON PLAN							
Department of Mechanical Engineering							
Name of the Subject	Hydraulics and Pneumatics			Name of the handling Faculty	Dr.Prasath S		
Subject Code	ME8694			Year / Sem	III / VI		
Acad Year	2021-2022			Batch	2019-2023		
Course Objective							
OBJECTIVES:							
To provide student with knowledge on the application of fluid power in process, construction and manufacturing Industries.							
To provide students with an understanding of the fluids and components utilized in modern industrial fluid power							
To develop a measurable degree of competence in the design, construction and operation of fluid power circuits.							
Course Outcome							
Upon the completion of this course the students will be able to							
CO1 : Explain the fluid power and operation of different types of pump							
CO2 : Discuss the features and functions of Hydraulic motors, actuators and Flow control valves							
CO3 : Explain the different types of Hydraulic circuits and systems							
CO4 : Explain the working of different pneumatic circuits and systems							
CO5 : Discuss the various trouble shooting methods and applications of hydraulic and pneumatic systems.							
Lesson Plan							
Sl. No.	Topic(s)	T / R*	Periods Required	Mode of Teaching (BB / PPT / NPTEL / MOOC / etc)	Blooms Level (L1-L6)	CO	PO
		Book					
UNIT I :FLUID POWER PRINCIPLES AND HYDRAULIC PUMPS							
1	Introduction to Fluid power , Advantages and Applications	T	1	BB	L1	CO1	PO1,PO2
2	Fluid power systems,Types of fluids	T	1	BB	L3	COI	PO1
3	Properties of fluids and selection ,Basics of Hydraulics	T	1	BB	L2	CO1	PO1
4	Pascal's Law, Principles of flow	T	1	BB	L2	COI	PO1.PO2
5	Friction loss ,Work, Power and Torque Problems	T	1	BB	L1	CO1	PO1.PO2
6	Sources of Hydraulic power : Pumping Theory , Pump Classification	T	1	BB	L2	COI	PO1
7	Pump Classification,Construction	T	1	PPT	L2	CO1	PO1
8	Pump Classification , Construction, Working, Design, Advantages, Disadvantages,	T	1	PPT	L2	CO1	PO1

9	Selection criteria of Linear and Rotary , Fixed and Variable displacement pumps,Problems.	R	1	PPT	L3	CO1	PO1
Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any. Assignment given to the students							
Evaluation method * assignments are evaluated by online screening through viva voice,marks were given based on the students answer to the question.							
UNIT II : HYDRAULIC ACTUATORS AND CONTROL COMPONENTS							
10	Hydraulic Actuators: Cylinders ,Types and construction	T	1	BB	L2	CO2	PO1
11	Types and construction, Application, Hydraulic cushioning	T	1	BB	L2	CO2	PO1
12	Hydraulic motors , Control Components	T	1	BB	L2	CO2	PO1
13	Direction Control, Flow control and pressure control valves	T	1	BB	L2	CO2	PO1
14	control valves,Types, Construction and Operation	T	1	PPT	L2	CO2	PO1
15	Servo and Proportional valves , Applications	T	1	PPT	L3	CO2	PO1,PO2
16	Accessories : Reservoirs, Pressure Switches	T	1	BB	L3	CO2	PO1
17	Pressure Switches ,ApplicationsFluid Power ANSI Symbols, Problems.	T	1	PPT	L2	CO2	PO1
18	Fluid Power ANSI Symbols , Problems.	T	1	PPT	L3	CO2	PO1
Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any. Quiz given to the students							
Evaluation method * Quiz are evaluated by online.							
UNIT III:HYDRAULIC CIRCUITS AND SYSTEMS							
19	Accumulators and Types	T	1	BB	L2	CO3	PO1
20	Intensifiers, Industrial hydraulic circuits	T	1	BB	L2	CO3	PO1,PO2
21	Industrial hydraulic circuits ,Regenerative, Pump Unloading	T	1	BB	L2	CO3	PO1,PO2,PO3
22	Industrial hydraulic circuits,Regenerative, Pump Unloading	T	1	PPT	L2	CO3	PO1,PO2,PO3
23	Industrial hydraulic circuits Double Pump, Pressure Intensifier	T	1	PPT	L2	CO3	PO1,PO2,PO3
24	Air-over oil, Sequence, Reciprocation circuits	T	1	PPT	L2	CO3	PO1,PO2,PO3
25	Synchronization, Fail-Safe, Speed Control circuits	T	1	PPT	L2	CO3	PO1,PO2,PO3
26	Hydrostatic transmission, Electro hydraulic circuits	T	1	PPT	L2	CO3	PO1,PO2,PO3
27	Mechanical hydraulic servo systems.	T	1	PPT	L3	CO3	PO1,PO2,PO3

Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any.
Assignment given to the students

Evaluation method
*** assignments are evaluated by online screening through viva voice,marks were given based on the students answer to the question.**

UNIT IV: PNEUMATIC AND ELECTRO PNEUMATIC SYSTEMS

28	Properties of air,Perfect Gas Laws	T	1	BB	L1	CO4	PO1,PO2
29	Compressor and Types	T	1	BB	L2	CO4	PO1,PO2
30	Filters, Regulator, Lubricator	T	1	BB	L2	CO4	PO1,PO2
31	Muffler, Air control Valves	T	1	PPT	L2	CO4	PO1,PO2
32	Quick Exhaust Valves, Pneumatic actuators	T	1	PPT	L2	CO4	PO1,PO3
33	Design of Pneumatic circuit	T	1	BB	L3	CO4	PO1,PO3
34	Design of Pneumatic circuit , Cascade method	T	1	BB	L3	CO4	PO1,PO3
35	Electro Pneumatic System	R	1	BB	L3	CO4	PO1,PO3
36	Ladder diagram, Problems, Introduction to fluidics and pneumatic logic circuits.	R	1	BB	L3	CO4	PO1,PO3

Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any.
Assignment given to the students

Evaluation method
*** assignments are evaluated by online screening through viva voice,marks were given based on the students answer to the question.**

UNIT V: TROUBLE SHOOTING AND APPLICATIONS

37	Installation, Selection, Maintenance	T	1	BB	L2	CO5	PO1,PO2
38	Trouble Shooting and Remedies in Hydraulic and Pneumatic	T	1	BB	L3	CO5	PO1,PO3
39	systems, Design of hydraulic circuits for Drilling	T	1	BB	L3	CO5	PO1,PO3
40	Design of hydraulic circuits for Planning, Shaping, Surface grinding	T	1	PPT	L3	CO5	PO1,PO3
41	Design of hydraulic circuits for Press and Forklift applications	T	1	PPT	L3	CO5	PO1,PO3
42	Design of Pneumatic circuits for Pick and Place applications	T	1	PPT	L3	CO5	PO1,PO3
43	Design of Pneumatic circuits for tool handling	T	1	PPT	L3	CO5	PO1,PO3
44	Design of Pneumatic circuits for CNC Machine tools	T	1	BB	L3	CO5	PO1,PO3
45	Low cost Automation , Hydraulic and Pneumatic power packs.	T	1	BB	L2	CO5	PO1,PO3

Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any *Case studies given to the students											
Evaluation method: Evaluation of Case studies report.											
Content Beyond the Syllabus Planned											
Text Books											
1	Anthony Esposito, “Fluid Power with Applications”, Pearson Education 2005.										
2	Majumdar S.R., “Oil Hydraulics Systems- Principles and Maintenance”, Tata McGrawHill, 2001.										
Reference Books											
1	Anthony Lal, “Oil hydraulics in the service of industry”, Allied publishers, 1982.										
2	Dudelyt, A. Pease and John T. Pippenger, “Basic Fluid Power”, Prentice Hall, 1987										
3	Majumdar S.R., “Pneumatic systems – Principles and maintenance”, Tata McGraw Hill, 1995										
4	Michael J, Prinches and Ashby J. G, “Power Hydraulics”, Prentice Hall, 1989.										
5	Shanmugasundaram.K, “Hydraulic and Pneumatic controls”, Chand & Co, 2006										
Website / URL References											
1	https://nptel.ac.in/courses/112/105/112105046/										
2	https://nptel.ac.in/courses/112/105/112105047/										
3	https://nptel.ac.in/courses/112/106/112106175/										
4											
5											
Blooms Level											
Level 1 (L1) : Remembering			Lower Order Thinking	Fixed Hour Exams	Level 4 (L4) : Analysing			High er Order Think	Projects / Mini Projects		
Level 2 (L2) : Understanding					Level 5 (L5) : Evaluating						
Level 3 (L3) : Applying					Level 6 (L6) : Creating						
Mapping syllabus with Bloom’s Taxonomy LOT and HOT											
Unit No	Unit Name		L1	L2	L3	L4	L5	L6	LO	HOT	Total
Unit 1	FLUID POWER PRINCIPLES AND HYDRAULIC PUMPS		2	5	2	0	0	0	9	0	9
Unit 2	HYDRAULIC ACTUATORS AND CONTROL COMPONENTS		0	6	3	0	0	0	9	0	9
Unit 3	HYDRAULIC CIRCUITS AND SYSTEMS		0	8	1	0	0	0	9	0	9
Unit 4	HYDRAULIC CIRCUITS AND SYSTEMS		1	4	4	0	0	0	9	0	9
Unit 5	TROUBLE SHOOTING AND APPLICATIONS		0	2	7	0	0	0	9	0	9
Total			3	25	17	0	0	0	#	0	45
Total Percentage			6.6667	55.556	37.778	0	0	0	#	0	100
CO PO Mapping											

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1										2	1
CO2	3	2	1										2	1
CO3	3	2	1										2	1
CO4	3	2	1										2	1
CO5	3	2	1										2	1
Avg	3	2	1										2	1
Justification for CO-PO mapping														
CO1	PO1:Applying of engineering concept is more predominant, PO2: Applying the formulas and analyze the problems considered moderately													
CO2	PO1:Applying of engineering concept is more predominant, PO2: Applying the formulas and analyze the problems considered moderately													
CO3	PO1:Applying of engineering concept is more predominant, PO2: Applying the formulas and analyze the problems considered moderately													
CO4	PO1:Applying of engineering concept is more predominant													
CO5	knowledge of mathematics science engineering fundamentals is required (PO1), first principles of mathematics is required for solving (PO2), Design solutions for complex engineering problems (PO3)													
3		High level			2		Moderate level			1		Low level		
Name & Sign of Faculty Incharge : Dr.PRASATH S														
Name & Sign of Subject Expert : Dr.PRASATH S														
Head of the Department : Dr.PRASATH S														

Format No :231