

BMEE318E	Fluid Power Systems	L	T	P	C
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Pre-requisite	BMEE204L, BMEE204P	Syllabus version			
		1.0			
Course Objectives					
<ol style="list-style-type: none"> 1. To introduce fundamental principles of fluids for power transmission. 2. To impart constructs to design fluid power circuits for widespread industrial applications. 3. To realize the maintenance and troubleshooting procedures for fluid power systems. 					
Course Outcomes					
At the end of the course, the student will be able to					
<ol style="list-style-type: none"> 1. Demonstrate the fundamental concepts governing fluid power. 2. Analyse the functions of hydraulic and pneumatic components. 3. Design fluid power circuits for industrial applications. 4. Develop electro-hydraulic and electro-pneumatic systems for an industrial application. 5. Examine the maintenance and identify faults in fluid power systems. 6. Demonstrate fluid power circuits and analyse the experimental data. 					
Module:1	Basics of fluid power system and fluid characteristics	5 hours			
Introduction to fluid power systems - structure, advantages, limitations, and applications. Properties of fluids, governing laws. Gas laws - Vacuum. Distribution of fluid power and energy losses. ISO symbols for fluid power system.					
Module:2	Hydraulic and Pneumatic Power Sources	6 hours			
Hydraulic pumps - classification, characteristics, and pump selection. Flow, pressure, drive torque and power - hydraulic power Pack - pump efficiency. Air compressors - types and performance - sizing. Vacuum pumps. Pneumatic conditioners: filters, regulators, lubricators, mufflers, and air dryers. Selection of prime movers for fluid power systems.					
Module:3	Fluid power actuators and control valves	6 hours			
Fluid power actuators: cylinders and motors - selection and characteristics. Control valves: pressure, flow, and direction control - electronic control components - valve configurations - selection criteria.					
Module:4	Basic fluid power circuits	7 hours			
Hydraulic circuits: control of single acting and double acting cylinder, regenerative, synchronizing, sequencing, and pressure intensifier circuits. Pneumatic circuits: meter-in, meter-out and bleed-off circuits, fail-safe, and counter-balance circuits.					
Module:5	Design of fluid power circuits	7 hours			
Design of hydraulic and pneumatic circuits: Cascade and sequential logic circuit - Compound circuit – Step counter circuit. Telescopic cylinder - Accumulator circuits.					
Module:6	Electro-hydraulic and electro-pneumatic systems	6 hours			
Electrical control of pneumatic and hydraulic circuits: relays, timers, counters, programmable logic controller, and servo systems - Applications.					
Module:7	Maintenance of fluid power systems	6 hours			
Installation and maintenance of hydraulic and pneumatic systems - pressure compensation - temperature effects - fault finding - safety procedures.					
Module:8	Contemporary issues	2 hours			
Total Lecture hours:					45 hours
Text Book					
1.	John S. Cundiff, Michael F. Kocher, Fluid Power Circuits and Controls: Fundamentals and Applications, 2019, Second Edition. CRC Press.				
Reference Books					
1.	Daines, J. R., Daines, M. J, Fluid Power: Hydraulics and Pneumatics, 2019, United States: Goodheart-Willcox Company, Incorporated.				

2.	Anthony Esposito, Fluid Power with Applications, India: Dorling Kindersley, 2014.		
Mode of Evaluation: CAT, Written assignment, Quiz, FAT			
Indicative Experiments			
1.	Study of hydraulic/pneumatic components and standard symbols		
2.	Development of single cylinder hydraulic circuit with simulation software		
3.	Development of single multi-cylinder hydraulic circuits with simulation software		
4.	Development of electro-hydraulic circuits with simulation software		
5.	Development of single cylinder pneumatic circuits with simulation software		
6.	Development of multi-cylinder pneumatic circuits with simulation software		
7.	Development of electro-pneumatic circuits with simulation software		
8.	Development of PLC controlled fluid power circuits with simulation software		
9.	Design hydraulic circuits with single acting cylinder		
10.	Design hydraulic circuits with double acting cylinder		
11.	Design hydraulic circuits with hydraulic rotary actuator		
12.	Design of pneumatic circuits with multi cylinders		
13.	Design of multi-cylinders sequencing with pilot control valves		
14.	Design and control of multi-cylinders sequencing with PLC processor		
15.	Design fluid power circuits for an industrial application		
Total Laboratory Hours			30 hours
Textbook			
Lab manual prepared by the Faculty member			
Mode of assessment: Continuous assessment, FAT, Oral examination			
Recommended by Board of Studies		09-03-2022	
Approved by Academic Council		No. 65	Date 17-03-2022