



FACULTY OF ENGINEERING & TECHNOLOGY

First Year Master of Engineering

Semester I

Course Code: 102320107

Course Title: Oil Hydraulics and Pneumatics

Type of Course: Program Elective II

Course Objectives: To design and implement simple fluid power systems common in industrial applications using commercial components like pumps, actuators and various valves and enabling students to integrate hydraulic, pneumatic and electric components into a unique system.

Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
Lecture	Tutorial	Practical		Internal		External		Total
				Theory	J/V/P*	Theory	J/V/P*	
3	0	2	4	40 / 16	20 / 08	60 / 24	30 / 12	150 / 60

* J: Jury; V: Viva; P: Practical

Detailed Syllabus:

Sr.	Contents	Hours
1	Introduction: Fundamentals of oil hydraulics and pneumatics, Control functions of oil hydraulic systems; Comparison between Mechanical, Oil Hydraulic, Pneumatic and Electrical power transmission systems; Advantages, disadvantages and Applications of Oil Hydraulic and Pneumatic power transmissions. Hydraulic & Pneumatic Symbols as per ISO/ANSI.	03
2	Hydraulic Oils, Fluid Properties and Filter: Types, Properties, functions of hydraulic Oils, ISO Viscosity grades, Classification- Mineral based, Fire resistant & Biodegradable Oils, Filters, Contaminations, Filter rating, location of filter.	05
3	Hydraulic Pumps, Valves and Actuators: 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.	10
4	Hydraulic system Accessories and Design of hydraulic circuits: Reservoirs, Accumulators, Heating & cooling devices, Basic hydraulic circuits, Industrial hydraulic circuits, Power losses in flow control circuits.	07
5	Introduction to Pneumatic systems, Air Compressor, Service Unit, pneumatic actuators and Pneumatic valves: Basic Requirements for Pneumatic System, Applications, Types & Selection criteria for Air Compressors, Air receiver, FRL unit, Air filter, Pressure regulator and Lubricator, Types of Pneumatic Cylinders & Air motors, Cushion assembly, Pneumatic Direction control valves, Quick exhaust, Time delay, Shuttle and Twin pressure valves.	10



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6	Pneumatic circuits: Basic pneumatic circuits, Conventional method, Cascade method.	02
7	Electro-Pneumatics and Electro Hydraulics: Overview and applications, System components, Development of single and multiple Actuator Circuits.	02
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Suggested Specification table with Marks (Theory) (Revised Bloom's Taxonomy):

Distribution of Theory Marks						R: Remembering; U: Understanding; A: Application, N: Analyze; E: Evaluate; C: Create
R	U	A	N	E	C	
10	15	15	10	10	10	

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

1	S R Majumdar, Oil Hydraulic Systems Tata McGraw-Hill
2	S R Majumdar Pneumatic Systems Tata McGraw-Hill
3	John Pippenger & Taylor Hicks Industrial Hydraulics McGraw-Hill
4	Anthony Esposito, Fluid Power, Prentice Hall
5	Andrew Parr, Hydraulics & Pneumatics, Jaico Publications
6	Fluid Power with Applications by Anthony Esposito, Pearson
7	The Analysis & Design of Pneumatic Systems by B. W. Anderson, John Wiley.
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Course Outcomes (CO):

Sr.	Course Outcome Statements	%weightage
CO-1	Students will be able to understand basics of Hydraulic and Pneumatic systems and components used in these systems.	30
CO-2	Students will be able to design Hydraulic and Pneumatic circuits for various applications.	40
CO-3	Students will be able to understand fundamentals of electro hydraulic and electro-pneumatic systems.	30
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CO-5	Click or tap here to enter text.	Click
CO-6	Click or tap here to enter text.	Click
CO-7	Click or tap here to enter text.	Click
CO-8	Click or tap here to enter text.	Click



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CO-9	Click or tap here to enter text.	Click
CO-10	Click or tap here to enter text.	Click



List of Practicals / Tutorials:

Practicals

1	Hydraulic Extend-Retract and Stop system of a linear actuator.
2	Hydraulic Regenerative circuit.
3	Hydraulic Speed Control circuits: meter-in, meter-out and bleed off.
4	Hydraulic sequencing circuit
5	Use of solenoid operated DCV.
6	Study of Compressor, FRL unit and 5/3 DCV.
7	Reciprocating motion of a single and a double acting actuators using 5/3 DCV in pneumatic system.
8	Pneumatic Speed control circuits: meter-in, meter-out.
9	Automatic to & fro motion of a pneumatic linear actuator.
10	Pneumatic sequencing circuit.
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Supplementary learning Material:

1	Fluidsim hydraulic tutorials for refrence.
2	Fluidsim pneumatic tutorials for refrence.
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Curriculum Revision:

Version:	1
Drafted on (Month-Year):	Apr-20



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Last Reviewed on (Month-Year):	Jul-20
Next Review on (Month-Year):	Apr-22