SARVAJANIK UNIVERSITY

Sarvajanik College of Engineering and Technology

Bachelor of Technology

Mechanical Engineering Department

Semester VII

Course Name: **Oil, Hydraulics and Pneumatics** **Course Code: BTME14714**

Type of course: **Professional Elective Course**

Prerequisite: **Nil**

Rationale of Course: This course is designed to develop underpinning knowledge of hydraulic and pneumatic systems which are widely used for control and other purposes. Also different valves related to hydraulic and pneumatic systems are discussed in syllabus. Subject is also useful for designing the various hydraulic and pneumatic circuits for improvement of engineering processes and devices.

Teaching and Examination Scheme:

TEACHING SCHEME				Theory Marks			Practical Marks		Total
L	T	P	C	TEE	CA1	CA2	TEP	CA3	
3	0	0	3	60	25	15	00	00	100

CA1: Continuous Assessment (assignments/projects/open book tests/closed book tests **CA2:** Sincerity in attending classes/class tests/ timely submissions of assignments/self-learning attitude/solving advanced problems **TEE:** Term End Examination **TEP:** Term End Practical Exam (Performance and viva on practical skills learned in course) **CA3:** Regular submission of Lab work/Quality of work submitted/Active participation in lab sessions/viva on practical skills learned in course

Content:

Sr. No.	Content	Total Hrs	Module Weightage
1	**Introduction:** Introduction, Basic system of Hydraulics. Advantages and disadvantages, Comparison among Electrical, Hydraulics and Pneumatics System, Principles of Hydraulic Fluid power. Hydraulic Symbols, Electrical Elements used in hydraulic circuits .	07	15%

2	**Hydraulic Oils, Fluid Properties and Filter:** Types, Properties, physical characteristics & functions of hydraulic Oils, Classification Mineral based, Fire resistant& Biodegradable Oils, Filters, Contaminations, location of filter.	**07**	**15%**
3	**Hydraulic Pumps, Motors, Valves and Actuators:** Pump Classification, Gear Pumps, Vane Pumps, Piston Pumps, Axial piston pumps, Hydraulic motors. Direction control valves, Pressure control valves, Flow control valves, Non-return valves, Reservoirs, Accumulators, Heating & cooling devices, Hoses. Types of Hydraulic Actuators, Selection criterion of Actuators, Linear and Rotary Actuators, Hydrostatic Transmission Systems.	**12**	**30%**
4	**Introduction to Pneumatic Systems:** Basic Requirements for Pneumatic System, Applications. Types & Selection criteria for Air Compressors, Air receiver, Pipeline Layout, Air filter, Pressure regulator and Lubricator (FRL unit).	**05**	**10%**
5	**Pneumatic Cylinders, Motors and Valves:** Types of Pneumatic Cylinders & Air motors, Cushion assembly, mounting Arrangements, Pneumatic Direction control valves, Quick exhaust, Time delay Shuttle and Twin pressure valves.	**07**	**15%**
6	**Automation of Hydraulics and Pneumatics:** Introduction to Automation in hydraulic and Pneumatic Systems, Case study of Automation using Hydraulics and pneumatics. Introduction to software of hydraulic and Pneumatic system, Circuit designing in software, Simulation in software, Simulation with actual component using software like automation in industry	**07**	**15%**

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10	**30**	**30**	**10**	**10**	**10**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

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:

Sr no	Title of book /article	Author(s)	Publisher and details like ISBN	Year of publication	Publication Edition
1.	Oil Hydraulic Systems, Principle and Maintenance	S R Majumdar	McGraw Hill.	2017	1st
2.	Fluid Power with Applications	Anthony Esposito	Pearson	2008	7th
3.	Fluid Power: Generation, Transmission and Control	Jagadeesha T., Thammaiah Gowda	Wiley	2013	Latest
4.	Pneumatic Systems: Principle and Maintenance	S R Majumdar	McGraw Hill.	2017	1st

Course Outcomes:

Sr. No.	CO Statement After learning this subject, students will be able to	Marks % weightage
CO-1	Operate and maintain hydraulic and pneumatic systems and their applications.	20
CO-2	Explanation of the Fluid power and operation of different types of pumps.	25
CO-3	Interpret the features and functions of Hydraulic motors, actuators and Flow control valves	35
CO-4	Compare different pneumatic circuits and systems	10
CO-5	Use of automation in hydraulic and pneumatic systems.	10

Mapping with POs:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO-1	3	2	1	1	0	0	2	1	0	1	2	2	3	1	0
CO-2	2	2	0	2	2	0	3	0	1	0	1	3	2	1	0
CO-3	3	2	0	2	2	2	2	1	1	1	1	2	2	0	0
CO-4	2	1	0	2	2	3	2	0	1	0	1	2	2	1	0
CO-5	2	0	0	1	2	3	2	1	1	1	2	3	2	1	0
Rationale*	**12**	**07**	**01**	**8**	**8**	**8**	**11**	**3**	**4**	**3**	**7**	**12**	**11**	**4**	**0**

Rationale*:
It states that the course will develop Engineering Knowledge, Problem analysis, Design / development of solutions, Life- long learning. It focuses on knowledge of Hydraulic and pneumatic systems. This Course also focuses on safety measure and research-innovation work for startup/higher studies.

This course highly maps with PO 1, 7, 12 and PSO 1. It states that the course will develop Engineering knowledge, Environment and sustainability, Life-long learning. This Course also focuses on Problem analysis, Design / development of solutions, Conduct investigations of complex problems, Modern tool usage, the engineer and society, Ethics, Individual and teamwork, Communication, Project management and finance.

Assignments to be given as per the requirement of the course.

List of Open learning website: https://nptel.ac.in/courses/112106300