Course Type	Course Code	Name of Course	L	T	P	Credit
DC	MMC 209	HYDRAULICS AND PNEUMATICS	3	0	0	9

Course Objective

The course will give a brief overview of basic hydraulic and pneumatic system, its major components, design, application and maintenance.

Learning Outcomes

Upon successful completion of this course, students will:

- Design of Fluid power circuits with standard symbols.
- Demonstrate working principles and constructional details of major components used in Fluid Power Systems.
- System components and drives.
- Design and develop low cost automation circuits for industrial problems.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	Basic theories of fluid mechanics applicable to hydraulic systems, Advantages and disadvantages of hydraulic power over the others, Properties of hydraulic fluid, ISO Symbols of hydraulic components, Gaps as basic hydrostatic element of hydraulic component, thermal and inertia effects on fluid properties in gaps.	4	Basic introduction to hydraulic system and their applications.
2	Properties of fluid, Different types of hydraulic fluid used in power transmission system and their properties, Fire Resistant fluid	2	Properties of fluid and their selection for different applications.
3	Hydrostatic pumps, motors and other actuators: Positive displacement pump and its classification, Basic theories of their volume displacement rate, their construction, operation, design, performance characteristics, applications, maintenance and innovations.	8	Design of positive displacement pump and their application and maintenance.
4	Hydrostatic valves: Classification, construction, performance characteristics of different types of direction, flow and pressure control valves, their applications based on performances.	6	Different hydraulic valves, their application and maintenance.
5	Construction and operation of servo and proportional valves.	3	Basic design, applications and maintenance of proportional and servo valves.
6	Hydraulic accessories: Construction, operation and design of filter, cooler, reservoir, accumulator and hoses.	4	Design of accessory hydraulic components and their applications.
7	Hydraulic power pack: Hydraulic handling, Design, construction and operation of hydraulic power pack for rotary and linear drive.	2	Basic of power pack and its elements.
8	Hydrostatic transmission system: Classification, design, construction and application. Hydraulic system for industrial equipment. e.g. Counter balance circuit, sequencing circuit, tandem actuator of hydraulic actuators, steering circuit used in automobiles, Hydraulic press circuit operation, Accumulator circuit for intermittent operation of actuators. Recent innovations in design of hydraulic system to reduce fuel/energy consumption.	4	Understanding different hydraulic systems to be designed under given applications.
9	Design of complete hydraulic system and drawing hydraulic circuit: Calculation of hydraulic system.	3	Design complete hydraulic system as per applications and requirement.

10	Pneumatic systems: Introduction to pneumatic system, major components used, merit and limitation and its applications.	6	Basic introduction to pneumatic system and its application.

Text Books:

1. Majumdar, S. R. (2013). Hydraulic systems: Principles and maintenance. Tata McGraw-Hill Education.
2. Majumdar, S. R. (2010). Pneumatic systems: Principles and maintenance. Tata McGraw-Hill Education.

References

1. Merritt, H., Merritt, H. E., & Merritt, H. E. (1967). *Hydraulic control systems*. John Wiley & Sons.
2. Power Hydraulics, Pinches, Prentice Hall Publication (1988).
3. Cundiff, J. S. (2001). *Fluid power circuits and controls: fundamentals and applications*. CRC Press.
4. Watton, J. (2009). Fundamentals of fluid power control. Cambridge University Press.
5. Jaroslav Ivantysyn, Monika Ivantysynova. (2003). Hydrostatic pumps and motors: principles, design, performance, modelling, analysis, control and testing. Tech Books International.