ATF 223 - Hydraulic and Pneumatic Systems

(02 credits – 50 marks)

Learning Objectives:

The course should enable students:

1. Understand the basic properties of fluid, important principles of hydraulics with their applications and hydraulic devices used in practice.
2. Explain construction & working of Elements of Hydraulic and Pneumatic system.

Learning Outcomes:

After completion of the course, students are expected to be able to:

1. Verifying the conditions of fittings, oil, pipes, seals & packing of hydraulic systems in automobile vehicles.
2. Carry out troubleshooting and maintenance of Hydraulic & Pneumatic Systems.
3. Construct the Hydraulic and Pneumatic circuits for various applications.

Course Content:

Module –I: Introduction to fluid power (06 Hours)

Classification, application in various fluids of engineering, various hydraulic and pneumatic ISO/JIC Symbols, transmission of power at static and dynamic states, Types of hydraulic fluids and their properties, effect of temperature on fluids.

Module –II: Hydraulic system elements (07 Hours)

Control of fluid power elements- Pressure control, direction control, flow control valves, pilot operated, relief, pressure reducing, quick exhaust, sequence valves, flow control valves and their types, meter-in and meter-out circuit and flow through circuit. Types of direction control valves, Actuators – linear and rotary, hydraulic motors, types of hydraulic cylinders and their mountings. Hydraulic servo-system for rotary and linear motion

Module –III: Pneumatic Systems: (07 Hours)

Application of pneumatics, physical principles, basic requirement of pneumatic system, Comparison with hydraulic systems, Elements of Pneumatics, Air compressors, Pneumatic control valves, Pneumatic actuators - types and the mountings, Air motors – types, Pneumatic circuits – Basic pneumatic circuit, impulse operation, speed control, pneumatic motor circuit, sequencing of motion, time delay circuits and their applications. Pneumatic servo-system for linear and rotary motion

Module –IV: Automotive Applications, Maintenance and troubleshooting: **(06 Hours)**

Hydraulic tipping mechanism, power steering, fork lift hydraulic gear, hydro-pneumatic suspension Maintenance and trouble shooting of hydraulic & pneumatic circuits,

Introduction to fluidics-study of simple logic gates, turbulence, amplifiers, pneumatic sensors and applications.

Module –V: Assignments / seminars / case studies on Module -I to Module – IV (06Hrs)

References:

1. Industrial Hydraulic & pneumatics – J.J. Pippenger - McGraw Hill, ISBN-13: 978-0070501409
2. Fluid with applications – A. Esposito- PHI Publishers, ISBN: 9781292023878
3. Industrial Hydraulic Manual by Vicker Sperry, ISBN 10: 0963416200
4. Practical guide to Fluid Power by H.S. Stewart
5. ISO 1219 Fluid systems and components
6. Hydraulic and Pneumatic Controls, K. Shanmuga Sundaram, S. Chand Publication, ISBN : 81-219-2635-1
7. Introduction to Hydraulics and Pneumatics, S. Ilango and V. Soundararajan, PHI Learning Private Limited, New Delhi, ISBN: 9788120330795
8. Hydraulic and Fluid Mechanics, Dr. P N Modi Dr. SM Seth, Standard Book House, Delhi, ISBN No, 978-81-89401-26-9

   Hydraulic & pneumatics- Andrew Parr-Jaico Publishing House, ISBN-9780080966748