

GUJARAT TECHNOLOGICAL UNIVERSITY

B.E. SEMESTER : VIII

AUTOMOBILE ENGINEERING

Subject Name: **AUTOMOTIVE HYDRAULICS & PNEUMATIC SYSTEMS**

Sr. No.	Course Contents	Total Hrs
1.	Introduction to fluid power – Classification, application of various fluids in engineering, various Symbols used in hydraulic and pneumatic (ISO/JIC), transmission of power at static and dynamic states.	4
2.	Types of hydraulic fluids and their properties , effect of temperature on fluids.	4
3.	Hydraulic system elements: Control of fluid power elements Requirement of pressure control, direction control, flow control valves. Principles of pressure control valves, direction control valves, and pilot operated relief valve, pressure reducing valve, quick exhaust valve, sequence valves. Types of direction control valves – two way two position, four way two position, four way three position, open center, close center, tandem center, manual operated, solenoid, pilot operated direction control valves, check valves. Flow control valves: principle and their types, meter-in and meter-out circuit and flow through circuit. Actuators – linear and rotary, hydraulic motors, types of hydraulic cylinders and their mountings. Calculation of piston velocity, thrust under static and dynamic operation & Application, consideration of friction and inertia loads.	10
4.	Hydraulic servo-system for rotary and linear motions.	2
5.	Pneumatic Systems: 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	10
6.	Pneumatic circuits – Basic pneumatic circuit, impulse operation, speed control, pneumatic motor circuit, sequencing of motion, time delay circuits and their applications.	6
7.	Pneumatic servo-system for linear and rotary motion.	2
8.	Hydraulic Circuit - Basic hydraulic circuit, impulse operation, speed control, Hydraulic motor circuit, sequencing of motion, time delay circuits and their applications.	
9.	Typical Automotive Applications: Hydraulic tipping mechanism, power steering, fork lift hydraulic gear, hydro-pneumatic suspension (Air suspension), Clutch actuating System, Brakes – Hydraulic AND Pneumatic.	12
10.	Maintenance and trouble shooting of hydraulic & pneumatic circuits.	6
11.	Introduction to fluidics – study of simple logic gates, turbulence, amplifiers, pneumatic sensors and applications.	4

Text Books :

1. Hydraulic & pneumatics- Andrew Parr-Jaico Publishing House.
2. Basic fluid power- by D.A. Pease-PHI
3. Industrial Hydraulic & pneumatics – J.J. Pippenger - McGraw Hill
4. Fluid Power with applications – A. Esposito- PHI
5. Oil Hydraulics – B Lal- Intl- Literature

Reference Books:

1. Fluid power Design Hand book – Yeaple
2. Industrial Hydraulic Manual Vicker Sperry
3. Practical guide to Fluid Power H.S. Stewart

ISO 1219 Fluid systems and components