Marwadi University

Syllabus for Master of Technology

Subject Code: 01CA0205

Subject Name: Oil Hydraulics and Pneumatics

M.Tech. I Year – (Sem-2) CAD/CAM

Type of course: Program Elective
Prerequisite: None
Rationale: A revolutionary change has taken place in the field of fluid power technology. An engineer in the field of design may require knowledge of power transmission; or in the field of operation and maintenance needs to know the power transmission system of machine tools, presses, equipment. An engineer should be well acquainted with various selection and manufacturing techniques, control, procedure and application of hydraulic/pneumatic components.

Teaching and Examination Scheme:

Teaching Scheme (Hours)			**Credits**	**Evaluation Scheme**					Total Marks
				Theory Marks			Practical Marks		
Theory	Tutorial	Practical		ESE (E)	IA	CSE	Viva (V)	Term Work (TW)	
4	---	2	5	50	30	20	25	25	150

Sr. No.	Contents	Teaching Hrs.
1	**Introduction:** Functional requirements of a power transmission, how these requirements can be fulfilled by various power transmission systems like mechanical, oil hydraulic, pneumatic, electrical or their combinations; 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.	3
2	**Hydraulic Oils, Fluid Properties and Filter:** Types, Properties, functions of hydraulic Oils, ISOViscosity grades, Classification- Mineral based, Fire resistant& Biodegradable Oils, Filters, Contaminations, Filter rating, location of filter.	5
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, Electro-Hydraulic Servo valves, Linear and Rotary Actuators, Hydrostatic Transmission Systems.	13
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.	7
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.	11
6	**Pneumatic circuits:** Basic pneumatic circuits, Conventional method, Cascade	2

	method.	
7	**Electro-Pneumatics and Electro Hydraulics :** Overview and applications, System components, Development of single and multiple Actuator Circuits.	**4**

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

Course Outcome:

On completion of this course:

Sr. No.	Course Outcome	Percentage weightage
CO-1	Students will be able to understand basics of Hydraulic and Pneumatic systems and components used in these systems.	45%
CO-2	Students will be able to design Hydraulic and Pneumatic circuits for various applications.	45%
CO-3	Students will be able to understand fundaments of electro hydraulic and electro pneumatic systems.	10%

List of Experiments:

1. Introduction to graphical symbols as per DIN-ISO: 1219.
2. To understand working and construction of hydraulic components and basic circuits.
3. To understand working and construction of Pneumatic components and basic circuits. Construction of Basic hydraulic circuit.
4. Design of various hydraulic and electro hydraulic circuits used for automation purpose in industry.
5. Design of various pneumatic and electro pneumatic circuits used for automation purpose in industry.

Major Equipment:

1. A hydraulic trainer.
2. A pneumatic trainer.
3. PLC
4. Software like Automation Studio, where the simulation can be visualized.

List of Open Source Software/learning website:

1) Autosim Premium
2) Hydrosym
3) Scilab