

Course code	Course Name	L-T-P-Credits	Year of Introduction
ME465	Industrial Hydraulics	3-0-0-3	2016
<b>Prerequisite : Nil</b>			
<b>Course Objectives: :</b>			
<ol style="list-style-type: none"> <li>To introduce various fluid power systems</li> <li>To get knowledge on fluid power circuits</li> </ol>			
<b>Syllabus:</b>			
Introduction to fluid power, Properties of fluids. Selection of fluids, Pumps, Hydraulic cylinders and rams, Fluid power pumping systems and components, Hydraulic Actuators, Fluid temperature control, Piping systems, Control circuits			
<b>Expected Outcomes:</b>			
The students will be able			
<ol style="list-style-type: none"> <li>To understand the various components used in fluid power systems</li> <li>To select the suitable system for a particular application</li> <li>To know the various fluid circuits used in hydraulic systems</li> </ol>			
<b>Text books:</b>			
<ol style="list-style-type: none"> <li>B. Lall, Oil Hydraulics, International Literature Association</li> <li>D. A. Pease, Basic Fluid Power, Prentice Hall, 1986</li> <li>J. J. Pipenger, Tyler Gregory Hicks, Industrial Hydraulics, McGraw Hill, 1979</li> <li>Pinches, Industrial Fluid Power, Prentice Hall, 1989</li> <li>R.K. Bansal, Fluid Mechanics, Laxmi Publication (P) Ltd., 2017</li> </ol>			
<b>Reference:</b>			
<ol style="list-style-type: none"> <li>ISO - 1219, Fluid Systems and components, Graphic Symbols</li> <li>Andrew A. Parr, Hydraulics and Pneumatics, Elsevier, 1999</li> <li>Michael J. Pinches and Ashby J. G, Power Hydraulics, Prentice Hall, 1988</li> <li>Yeaple, Fluid Power Design Handbook, CRC Press, 1995</li> </ol>			
<b>COURSE PLAN</b>			
Module	Contents	Hours	End Sem. Exam. Marks
I	Introduction to fluid power – Hydraulics and Pneumatics systems – Fluid power systems – Fundamentals of fluid mechanics, Properties of fluids. Selection of fluids, additives, effect of temperature and pressure on hydraulic fluids, Measurement of physical parameters – Hydraulic symbols	7	15%
II	Pumps: Types, classification, principle of working & constructional details of vane pump, gear pumps, radial and axial plunger pumps, Power and efficiency calculations, char, Curves, selection of pumps for hydraulic power transmission	7	15%
<b>FIRST INTERNAL EXAMINATION</b>			

<b>III</b>	Hydraulic cylinders and rams – Fluid power pumping systems and components. Pressure accumulators – Functions – Fluid reservoirs – Filter in hydraulic circuits. Loading and replacement of filter elements – Materials for filters.	<b>7</b>	<b>15%</b>
<b>IV</b>	Hydraulic Actuators (i) Linear and Rotary. (ii) Hydraulic motors - Types- Vane, Gear, Piston types, radial piston. (iii) Methods of control of acceleration, deceleration. (iv) Types of cylinders and mountings. (v) Calculation of piston velocity, thrust under static and dynamic applications, considering friction, inertia loads. (vi) Design considerations for cylinders. Cushioning of cylinders.	<b>7</b>	<b>15%</b>
<b>SECOND INTERNAL EXAMINATION</b>			
<b>V</b>	Fluid temperature control – Fluid pressure control –control valves – Sequence -valve – Counterbalance valve-unloading valve – Friction control valve – Servo systems, Hoses & Pipes : Types , materials , pressure drop in hoses/pipes. Hydraulic piping connections.	<b>7</b>	<b>20%</b>
<b>VI</b>	Simple reciprocating, Regenerative, Speed control (Meter in, Meter out and bleed off), Sequencing, Synchronization, transverse and feed, circuit for riveting machine, automatic reciprocating, fail safe circuit, counter balance circuit, actuator locking, circuit for hydraulic press, unloading circuit (Numerical treatment), motor breaking circuit	<b>7</b>	<b>20%</b>
<b>END SEMESTER EXAMINATION</b>			

### Question Paper Pattern

**Maximum marks: 100**

**Time: 3 hrs**

The question paper should consist of three parts

**Part A**

There should be 2 questions each from module I and II

Each question carries 10 marks

Students will have to answer any three questions out of 4 (3X10 marks =30 marks)

**Part B**

There should be 2 questions each from module III and IV

Each question carries 10 marks

Students will have to answer any three questions out of 4 (3X10 marks =30 marks)

**Part C**

There should be 3 questions each from module V and VI

Each question carries 10 marks

Students will have to answer any four questions out of 6 (4X10 marks =40 marks)

Note: Each question can have a maximum of four sub questions, if needed.