Engineering Program

Specialty	**Automotive Maintenance**
Course Number	**20211117**
Course Title	**Hydraulic Fluid Power**
Credit Hours	**2**
Theoretical Hours	**2**
Practical Hours	**0**

Brief Course Description:

- Hydraulic fluid properties, density, viscosity and pressure, Pascal's Principle and Archimedes Principle, The Equation of Continuity. Bernoulli's Equation. Hydraulic components. Hydraulic circuits. Electric drive control.

Course Objectives:

- To identify the hydraulic components
- Explain the principle of operation and function oh hydraulic components
- To draw the hydraulic circuit
- To identify the electro hydraulic components
- To draw the electro hydraulic circuit
- Design the electro and electro hydraulics circuit
- Explain the principle of proportional valve
- Troubleshooting the hydraulics system

Detailed Course Description:

Unite number		Unite name	Unite content	Time Needed
1.	**Hydraulic basic**	Pressure and force, PASCAL's Low, Flow, Energy, Work and power		2 weeks
2.	**Hydraulic system**	Basic System, color coding, reservoir, strainers and filters, filtering material and elements, accumulators, pressure gauge and volume meter, circulatory system, fitting and connection, leakage, seals,		2 weeks
3.	**Pumps**	Pump classification, performance, displacement slippage, gear pump, vane pump, piston pump, pump operation		1 week
4.	**Hydraulic actuators**	Cylinders, construction and application, motors and application		1 week
5.	**valves**	Pressure control valves, directional control valves, flow control valves, valve installation, hydraulic circuits		2 weeks
6.	**Electrical components**	Solenoid valves. Principle of operation. electro-hydraulic directional valves. Electro-magnetic relays, connection diagrams.		2 weeks
7.	**electrical switches**	Pushbutton switches, limit switches, pressure switches, proximity switches, photocell, electro pneumatics circuits		2 weeks
8.	**Proportional valves**	Introduction to proportional control. Proportional directional control valves. Pressure proportional control valves. Flow proportional control valves. Comparison between ON-OFF drives and proportional drives		2 weeeks
9.	**Troubleshooting**	Testing hydraulics and pneumatics circuits, maintenances		2 weeks

Evaluation Strategies:

Exams		Percentage	Date
Exams	First Exam	20%	--/--/----
	Second Exam	20%	--/--/----
	Final Exam	50%	--/--/----
Homework and Projects		10%	
Discussions and lecture Presentations			

Teaching Methodology:

- Lectures

Text Books & References:

1. Hydraulics theory and applications from bosch,1984
2. Hydraulic instructor guide lab volt, theory and application, 2005
3. Hydraulic theory and Exercise FESTECH,2007 .
4. القيادة الكهرورئوية والكهروهيدروليكية، د. محمد عالية، م. زيد بولص حجازين، مكتبة المجتمع العربي للنشر والتوزيع، 2005، الأردن

Engineering Program

Specialty	**Common**
Course Number	
Course Title	**Hydraulic Fluid Power Lab.**
Credit Hours	**1**
Theoretical Hours	**0**
Practical Hours	**3**

Brief Course Description:

- Practice covers: hydraulic pumps, proportional valves, pressure relieve valves, solenoid valves, single acting and double acting cylinders, hydraulic circuits and electrical drive control.

Course Objectives:

- To draw the electro hydraulic circuit
- Design the electro and electro hydraulics circuit
- Explain the principle of proportional valve
- Adjustment proportional control
- Maintain the hydraulic components

Detailed Course Description:

Unite number		Unite name	Unite content	Time Needed
1	**Basic Hydraulic lab**	Pressure setting Initial setting procedure Control single acting cylinder Control of double acting cylinder Mid position stop control of hydraulic cylinder Speed control of hydraulic cylinder Pressure composition Hydraulic motor circuit And other application		6 weeks
2	**Electro hydraulic lab**	Ladder diagrams Basic electrically controlled hydraulic system Hydraulic sequencing of cylinder Different application in hydraulic system		4 weeks
3	**Servo control of hydraulic system practice**	Proportional directional control valves Acceleration and deceleration control valves Open-loop control of motor speed Proportional (P) control of motor speed (PI) control of motor speed (PID) control of motor speed Open loop control of cylinder rod position Closed loop control of cylinder rod position Closed loop control of cylinder pressure		1 week
4	**Troubleshooting**	Assembly and disassembly hydraulic components		1 week

□ **Evaluation Strategies:**

		Percentage	Date
1. Exams	Reports	30%	
	Midterm Exam	20%	
	Final Exam	50%	

5. Hydraulics theory and applications from bosch,1984
6. Hydraulic instructor guide lab volt, theory and application, 2005
7. Hydraulic theory and Exercise FESTECH,2007 .
8. القيادة الكهرورئوية والكهروهيدروليكية، د. محمد عالية، م. زيد بولص حجازين، مكتبة المجتمع العربي للنشر والتوزيع، 2005، الأردن