

Associate Degree Program

Specialization	Electro- Hydraulic and pneumatic Systems Of Heavy Vehicle
Course Number	020306131
Course Title	Electro- Hydraulic and pneumatic Systems 1
Credit Hours	3
Theoretical Hours	3
Practical Hours	0

Short Description:

Electro-hydraulic circuit, function, components, diagrams defect inspection for hydraulic systems used in artillery vehicles

Course Objectives:

To enable the Electro-Hydraulic specialists to and list the hydraulic, electric pneumatic systems in the army our vehicles operating the Jordan army forces – which include the study of schematic diagrams of the system send to know its components such as motors, pumps, reservoirs, valves, Ganges, filters, cylinders, restrictors, hydraulic gear boxes, gun systems like elevation, recoil, hydraulic suspension, rammers, torque, Converter etc ...

Detailed Description:

No.	Unit Title	Unit Content	Hours
1	<p>The study and listing of systems diagrams introduction of components for the followings</p>	<ul style="list-style-type: none"> • Power pack hydraulic diagram. • Manual and power elevation hydraulic diagram. • Manual and power traverse hydraulic diagram. • Rammer hydraulic diagram. • Equilibrator hydraulic diagram. • Suspension and recoil spade hydraulic system 	
2	<p>The study and analyses of operating circuits and its components of the followings</p>	<ul style="list-style-type: none"> • Electrical operating circuit of power pack and pressure • Switch electrical operating circuit of control handles. • Electrical operating circuit of power elevation. • Electrical operating circuit of power traversing (Lot raining hauls) 	
3	<p>main electro hydraulic systems and its components and its function</p>	<ul style="list-style-type: none"> • The study of main electro hydraulic systems and its components and its function. • Power pack, electric motor and pressure switch, reservoir, piston, relief valve, pressure Gauge, Oil index , Oil pump, Oil filters, control handles, and control valves, elevation 	

No.	Unit Title	Unit Content	Hours
		<p>auxiliary accumulator and manual pump elevating cylinder, locking valves and Relive valves cylinder, piston valve manifold, Axle(Trunnion)Retainer elevation control valves manual, elevation system manual, elevation pump, Accumulator, Feed (supply) valve, shuttle valve, Equilibrator cylinder, primary and secondary Accumulators relieve valve ,Traversing Mechanism ,Traversing Bypass and control valve, No back and traverse magnetic clutch Oil pump , Traverse gear box manual ,traverse Assembly hydraulic motor rammer system , rammer system operating valves Rammer cylinder piston, Tray Assembly handle and support, Assembly operating valves, Recoil system(mech), Recoil cylinder (Buffer), Recuperate cylinder , Buffer Cylinder,Replenished, Variable recoil</p> <ul style="list-style-type: none"> • Mechanism, breather valves(front and rear) hydraulic suspension system, hydraulic suspension system parts, hydraulic suspension system parts function, hydraulic suspension system parts principle of operation, recoil spade main parts and components, main parts and components function, main parts and components principle ofoperation, (4 training hours) 	

No.	Unit Title	Unit Content	Hours
4	<p>Study and follow electro hydraulic circuits</p>	<ul style="list-style-type: none"> • Fault finding power pack motor electrical operating circuits. • Manual elevation hydraulic circuits. • Manual and electro-Hydraulic traverse circuits. • Slip ring electrical circuits. • Loader and Rammer power operating circuits. • Recoil spade hydraulic circuit. (5 Training Hours). 	
5	<p>To know the operating of 120mm gun and its</p>	<ul style="list-style-type: none"> • components , Barrel, Barrel body (construction), fume extractor (Evacuator chamber), thermal sleeve, Equilibration rings, bregch ring assembly auto loader, breech block, gas and bturator assembly, firing needle, breech operating Assembly, Semi-Automatic cam assembly, breech block opening and closing handles, crank assembly gun cradle, breech block closing spring and crank • evaluation (Grading) 	

Teaching Methods:

- Lectures

Books and references:

1. Tmer – 7910-34-2-2, US Army.
2. Tmer – 7910-34-2, US Army.
3. TM9 – 2350-275-20-2, US Army.
4. TM9 – 2350 - 253-20 - 2 US Army.
5. TM9 – 1000 – 213 – 3 US Army.
6. TM9 – 2400 – 378 – 35 – 2 – 2 - US Army.
7. Trouble shooting of hydraulic system , prepared by Mustafa Shaban, University of Jordan, Industrial Engineering Department 1993 – 1992.
8. Fluid power handbook, directory by Editors of hydraulic and pneumatics. 1992- 1993.
9. Using industrial hydraulics
10. ics by T.C Franken Enfield

1. أصول الهيدروليك الهندسي م.ك ترجمة احمد فيصل اصفري وزارة التعليم العالي . الجمهورية العربية السورية 1977

2 ميكانيكا الموائع و الهيدروليكا – رينا لدف جاليز . ترجمة الدكتور عمرو محمود صبري . دار ماكجرو هيل للنشر 1981 .

3. كراسة م.أبراج طارق بن زياد كلية طلية الأمير الحسين بن عبدالله الفنية العسكرية القوات المسلحة الأردنية.

4. كلية الأمير الحسين بن عبدالله الفنية العسكرية كراسة م.أبراج الدبابة م 60.أ. 1 و م. 3.أ6. القوات المسلحة الأردنية.

5. كراسة م.أبراج الدبابة م 109 . م 110 كلية طلية الأمير الحسين بن عبدالله الفنية العسكرية القوات المسلحة الأردنية.

Associate Degree Program

Specialization	Electro- Hydraulic and pneumatic Systems Of Heavy Vehicle
Course Number	020306132
Course Title	Electro- Hydraulic and pneumatic Systems 1 workshops
Credit Hours	2
Theoretical Hours	0
Practical Hours	6

Short Description:

Practicing on Assembly disassembling and testing of the main component of the electro hydraulic systems used in artillery for controlling the movement of the turret and cannon

Course Objectives:

1. The capability to know and distinguish the hydraulic and pneumatic components and parts of the power pack, traverse, recoil, stabilization, protection systems and gun systems for the following M109A3 and M110 A2.
2. Disassembly reassembly and repair of the assemblies and groups in (Paragraph 1).
3. The capability to adjust and calibrate the Electro-Hydraulic systems to perform the preventive maintenance procedure to the systems.
4. Bearing in mind all industrial and personal safety Measures

Detailed Description:

No.	notes	Unit Content	Hours
1		The practical follow up the following hydraulic systems to know the hydraulic power pack system components to know the manual and power elevation system components to know the manual and power traverse system components to know the gun protection systems components to know the Auto loader system components to know the Equilibration system components, to know the recoil spade and hydraulic suspension systems components	
2		The practical follow up the hydraulic systems and its schematic diagrams. To know the power pack electro-Hydraulic operating circuit and the pressure switch operation, to know the control handles electro Hydraulic circuits, to know the power elevation and traverse electric controls and the operation of the magnetic clutch.	
3		Disassembly and reassembly of the electro hydraulic groups and practical application on the followings:- Power pack electrical motors and pressure switch, hydraulic reservoir and accumulator, pump, Gage and relieve valve, filter and controls valves, locking valves, elevation cylinder and piston , valve manifold elevation hand pump, , Auxiliary accumulator and control valves recoil Mechanism, Equilibrator accumulators, Buffer and recoil cylinders and variable recoil control system traverse gear box, manual traverse assay and hydraulic motor rammer trunnion, rammer cylinder, tray assembly, handle and support, hydraulic	

No.	notses	Unit Content	Hours
		suspension, recoil spade and lifting cylinders recoil pistons and cylinders, gun assembly.	
4		Following up and discovery of the electro hydraulic circuits in the following circuits faults, manual and power elevation circuits faults slip ring electrical circuits faults, loader and rammer power operating circuit faults recoil spade hydraulic circuit faults	
5		Study and follow electro hydraulic circuit , flutes elevation hydraulic circuits, travers circuit and slepring	
6		Delay maintenance power pack oil reservoir mechanism valves and cylinders weekly maintenance elevation mechanism, gun assembly rammer assembly, monthly maintenance elevating mechanism travel lock, quarterly maintenance Simi automatic cam, safety switch, Simi annual maintenance, traversing mechanism, oil filter ,annual maintenance, hydraulic power pack reservoir, variable recoil mechanism	

Teaching Methodology:

_ Laboratory

Text Books & References:

References:

1. Tmer – 7910-34-2-2, US Army.
2. Tmer – 7910-34-2, US Army.
3. TM9 – 2350-275-20-2, US Army.
4. TM9 – 2350 - 253-20 - 2 US Army.
5. TM9 – 1000 – 213 – 3 US Army.
6. TM9 – 2400 – 378 – 35 – 2 – 2 - US Army.
7. Trouble shooting of hydraulic system , prepared by Mustafa Shaban, University of Jordan, Industrial Engineering Department 1993 – 1992.
8. Fluid power handbook, directory by Editors of hydraulic and pneumatics. 1992-1993.
9. Using industrial hydraulics
10. ics by T.C Franken Enfield.
11. أصول الهيدروليكا الهندسي م.ك ترجمة احمد فيصل اصفري وزارة التعليم العالي . . الجمهورية العربية السورية 1977
12. ميكانيكا الموائع و الهيدروليكا – رينا لدف جاليز . ترجمة الدكتور عمرو محمود صبري . دار ماكجرو هيل للنشر 1981
13. كراسة م.أبراج طارق بن زياد كلية طلية الأمير الحسين بن عبدالله الفنية العسكرية القوات المسلحة الأردنية
14. كلية الأمير الحسين بن عبدالله الفنية العسكرية القوات المسلحة الأردنية. كراسة م.أبراج الدبابة م 6 أ. 1 و م 60أ3
15. كراسة أبراج الدبابة م 109 . م 110 كلية طلية الأمير الحسين بن عبدالله الفنية العسكرية القوات المسلحة الأردنية

Associate Degree Program

Specialization	Electro- Hydraulic and pneumatic Systems Of Heavy Vehicle
Course Number	020306231
Course Title	Electro- Hydraulic and pneumatic Systems 2
Credit Hours	3
Theoretical Hours	3
Practical Hours	0

Short Description:

Practicing on, assembling disassembling and testing on the main component of the electro hydraulic system used in tanks for controlling the movement of the torrent and cannon

Course Objectives:

The capability to know of the distinguish the electro hydraulic or pinup tic components of the power pack traverse, mechanism elevation mesh recoil mechanism stabilization , mechanism of disk clearance system, gun system for the M60 A1,M60A3, Tareq Of Khaled tanks, disassembly, reassembly of the systems, groups of the system above.The capability to adjust of the calibrate the electro hydraulic to perform the preventive maintenance required considering the application of safety and projective principles

Detailed Description:

No.	Unit title	Unit Content	Hours
1	<p>The practical flow of the following hydraulic system to know the</p>	<ul style="list-style-type: none"> • power pack hydraulic components • The manual and power elevation hydraulic components • The manual and power traversing system components • The disk clearance valve components • The super elevation system components • The equilibrator system components 	
2	<p>The practical follow of the hydraulic system diagrams, to know the</p>	<ul style="list-style-type: none"> • Hydraulic power pack and pressure switch components of principle of operation and circuits • The commander and gunner control handles components and circuits • The stabilization system circuit components • The operating circuits and electrical control of the power traversing elevation and the maintenance break 	
3	<p>Disassembly and reassembly of the elector hydraulic components the practical application on the following systems</p>	<ul style="list-style-type: none"> • Power pack motor and pressure switch, hydraulic reservoir accumulator, relive valve, pressure gage hydraulic pump, oil filter of control valves • Locking valves elevation cylinder, the piston, oil manifold elevation pump, auxiliary accumulator, valves in elevation cylinder, equilibrator cylinder, puffer shock absorber recoil system, recoil cylinder manual traversing system of hydraulic motor and gear box • Auto rammer trunnion or axles of its cylinders loading try, handle and 	

No.	Unit title	Unit Content	Hours
		support <ul style="list-style-type: none"> • Elevation and traverse servo valves assembly super elevation system • Recoil systems cylinder of piston gun assembly 	
4	<p>Follow and discover the electro hydraulic faults</p>	<ul style="list-style-type: none"> • Hydraulic power pack operating circuit faults • Manual and power elevation operating circuit faults super elevation operating circuits faults • Diss clearance valve operating circuits faults • Stabilization hydraulic system operating circuit faults • Recoil system and auto rammer operating circuits faults • Gun assembly faults. • Manual elector hydraulic traverse circuit faults • Slip ring electric circle faults 	
5.	<p>Adjustment and celebration</p>	<ul style="list-style-type: none"> • Travers back lash and clearance adjustment • Final drive pinion back lash and clearance • Elevation lock valve and relieve valve • Elevation trunnion and back lash system • Elevation of traverse systems draft • Simi Automatic cam adjustment • Parle measurement and elevation of Parle life. • Gun and recoil system exercise • Recoil system aeration (pleading). 	
6.	<p>Preventive maintenance</p>	<ul style="list-style-type: none"> • Delay maintenance • Power back oil reservoir, break bore, preach ring, firing mechanism, 	

No.	Unit title	Unit Content	Hours
		<p>valves and cylinder</p> <ul style="list-style-type: none"> • Weekly maintenance • Elevation maintenance, gun assembly, rammer assembly, monthly maintenance • Elevation mechanism bore evacuator, travel lock, recoil mechanism, periscope trunnion latch or lock . • Quarterly maintenance. • Semi automatic cam, gun cradle trunnion bearings, race ring, race ring gear, safety switch. • Semi annual maintenance Traversing mechanizes, oil filters, variable recoil mechanize, Semi automatic mechanisms • Annual maintenance. • Hydraulic power back reservoir, gun travel lock anti back lash mechanism, variable recoil mechanisms elevation 	

Teaching Methodology:

_ Lectures

Text Books & References:

References:

1. Tmer – 7910-34-2-2, US Army.
2. Tmer – 7910-34-2, US Army.
3. TM9 – 2350-275-20-2, US Army.
4. TM9 – 2350 - 253-20 - 2 US Army.
5. TM9 – 1000 – 213 – 3 US Army.
6. TM9 – 2400 – 378 – 35 – 2 – 2 - US Army.
7. Trouble shooting of hydraulic system , prepared by Mustafa Shaban, University of Jordan, Industrial Engineering Department 1993 – 1992.
8. Fluid power handbook, directory by Editors of hydraulic and pneumatics. 1992-1993.
9. Using industrial hydraulics
10. ics by T.C Franken Enfield.
11. أصول الهيدروليكا الهندسي م.ك ترجمة احمد فيصل اصفري وزارة التع ليم العالي . الجمهورية العربية السورية 1977
12. ميكانيكا الموائع و الهيدروليكا – رينا لدف جاليز . ترجمة الدكتور عمرو محمود صبري . دار ماكجرو هيل للنشر 1981
13. كراسة م.أبراج طارق بن زياد كلية طلية الأمير الحسين بن عبدالله الفنية العسكرية القوات المسلحة الأردنية
14. كلية الأمير الحسين بن عبدالله الفنية العسكرية القوات المسلحة الأردنية. كراسة م.أبراج الدبابة م 6 . أ. 1 و م 60أ
15. كراسة أبراج الدبابة م 109 . م 110 كلية طلية الأمير الحسين بن عبدالله الفنية العسكرية القوات المسلحة الأردنية

Associate Degree Program

Specialization	Electro- Hydraulic and pneumatic Systems Of Heavy Vehicle
Course Number	020306232
Course Title	Electro- Hydraulic and pneumatic Systems 2 workshops
Credit Hours	2
Theoretical Hours	0
Practical Hours	6

Short Description:

. Practicing on assembling disassembling and testing of the main component of the electro – hydraulic systems in tanks for controlling the movement of the turret and cannon

Course Objectives:

The capability to know destination the electro – hydraulic or pneumatic component of the power pack , traverse mechanism of deck clearance system , gun system for the M60A1 ,M60A3 , Tariq and Khalid tanks . Disassembly, Re assembly of the system and group of the system above. The capability to adjust of calibrate the electro – hydraulic to perform the preventive maintenance enquired considering the application of safety and protective principles

Detailed Description:

No.	content	Unit Content	Hours
1	<p>The practical follow of the follow hydraulic system</p>	<ul style="list-style-type: none"> • To know the power pack hydraulic components. • To know the manual and power elevation hydraulic components . • To know the deck clearance valve components. • To know the super elevation system components. • To know the auto loader system components . • To know the equilibrator system components 	
2	<p>The practical follow of hydraulic system diagrams</p>	<ul style="list-style-type: none"> • To know the hydraulic power pack , pressure switch components of principle of operation circuits . • To know the commander and gunner control handles components and circuit. • To know the stabilization system circuit components. • To know the operation circuits and electrical control of the power traversing and elevation and the mantic brake. 	
	<p>Disassembly and reassembly of the</p>	<ul style="list-style-type: none"> • Disassembly and reassembly of the electro hydraulic system components. 	

No.	content	Unit Content	Hours
3	<p>electro- hydraulic system components. the practical application on the following systems</p>	<p>The practical application on the following systems .</p> <ul style="list-style-type: none"> • Power pack electric motor pressure switch hydraulic reservoir, calculator, relief valve pressure gauge , hydraulic pump , oil filter control valves . • Locking valves , elevation cylinder , the piston , oil manifold elevation pump, auxiliary accumulator , valves inelevating cylinder , equllibrator cylinder , buffer cshock absorber recoil syste , recoil cylinders manual traversing system hydraulic motor gearbox . • Auto rammer trunnion or axle its cylinders loading tray , handle support . • Elevation travers servo valves assembly super Elevation system . • Recoil system cylinders pistons gun assembly 	
4	<p>Follow discover the electro hydraulic circuit faults hydraulic power pack operating circuit faults super elevation operating circuit faults</p>	<ul style="list-style-type: none"> • Follow discover the electro hydraulic circuit faults hydraulic power pack operating circuit faults super elevation operating circuit faults . • Deck elevance valve operating circuit faults stabilization hydraulic system operating circuit faults recoil system and auto rammer operating circuit 	

Al-Balqa' Applied University



جامعة البلقاء التطبيقية

تأسست عام 1997

Teaching Methodology:

_ Laboratory

Text Books & References:

References:

1. Tmer – 7910-34-2-2, US Army.
2. Tmer – 7910-34-2, US Army.
3. TM9 – 2350-275-20-2, US Army.
4. TM9 – 2350 - 253-20 - 2 US Army.
5. TM9 – 1000 – 213 – 3 US Army.
6. TM9 – 2400 – 378 – 35 – 2 – 2 - US Army.
7. Trouble shooting of hydraulic system , prepared by Mustafa Shaban, University of Jordan, Industrial Engineering Department 1993 – 1992.
8. Fluid power handbook, directory by Editors of hydraulic and pneumatics. 1992-1993.
9. Using industrial hydraulics
10. ics by T.C Franken Enfield.
11. أصول الهيدروليكا الهندسي م.ك ترجمة احمد فيصل اصفري وزارة التعمير العالي . الجمهورية العربية السورية 1977
12. ميكانيكا الموائع و الهيدروليكا – رينا لدف جاليز . ترجمة الدكتور عمرو محمود صبري . دار ماكجرو هيل للنشر 1981
13. كراسة م.أبراج طارق بن زياد كلية طلية الأمير الحسين بن عبدالله الفنية العسكرية القوات المسلحة الأردنية
14. كلية الأمير الحسين بن عبدالله الفنية العسكرية القوات المسلحة الأردنية. كراسة م.أبراج الدبابة م 6 أ. 1 و م 60أ3
15. كراسة أبراج الدبابة م 109 . م 110 كلية طلية الأمير الحسين بن عبدالله الفنية العسكرية القوات المسلحة الأردنية

Associate Degree Program

Specialization	Electro- Hydraulic and pneumatic Systems Of Heavy Vehicle
Course Number	020306241
Course Title	Industrial Applications of hydraulic systems
Credit Hours	3
Theoretical Hours	3
Practical Hours	0

Short Description:

. Hydrostatic system, torque converter, hydraulic transmission, track treat or hydraulic systems, recovery vehicles hydraulic systems, hydraulic diagrams of theses systems, functions and defect diagnoses

Course Objectives:

The student should be able to:
hydraulic systems for any industrial applications using in army forces, M88, Chieften, FMTV HEMTT and hydraulic diagrams of these systems

Detailed Description:

No.	Unit Title	Unit Content	Hours
1	Hydrostatic System	<ul style="list-style-type: none"> Main components of hydrostatic systems, diagrams for hydraulic systems, functions and defect diagnosis 	
2	Torque Converter	<ul style="list-style-type: none"> Main components of torque converter diagrams for hydraulic systems, function and defect diagnosis 	
3	Hydraulic transmission for (D966) CAT	<ul style="list-style-type: none"> Introduction for hydraulic transmission, Main components of hydraulic transmission, hydraulic diagrams, function and defect diagnosis 	
4	Hydraulic systems of (D7G) CA	<ul style="list-style-type: none"> Main components, function hydraulic diagrams 	
5	Hydraulic systems of Chieftain	<ul style="list-style-type: none"> Main components, function hydraulic diagrams 	
6	Hydraulic system of M88 A1	<ul style="list-style-type: none"> Main components, function hydraulic diagrams , function and defect diagnosis 	
7	Hydraulic system of (FMTV)	<ul style="list-style-type: none"> Main components, function hydraulic diagrams troubleshooting of hydraulic systems 	
8	Hydraulic systems of (HEMTT)	<ul style="list-style-type: none"> Main components, function hydraulic diagrams troubleshooting of hydraulic systems 	

Teaching Methods:

-Lecture

Text Books & References:

References:

1. TMG 2350-256-34-2 SEME ARUCHIEETAIN FV4204 hydraulic pinch. Fluid power hand book.
2. Wheel loader shop manual (A66D CAT).
3. D7G Tractor shop manual CAT.
4. كراسة المعدات الهندسية.
5. كراسة النظام الهيدروليكا لونش الإنقاذ الشيفتين.
6. كراسة النظام الهيدروليكي لآلية FMTV.
7. كراسة النظام الهيدروليكي لآلية HEMMIT.

Associate Degree Program

Specialization	Electro- Hydraulic and pneumatic Systems Of Heavy Vehicle
Course Number	020306242
Course Title	Industrial applications of hydraulic systems workshops
Credit Hours	2
Theoretical Hours	0
Practical Hours	6

Short Description:

An integrated design project to practice the principles of analysis and design acquired throughout the course of the students study

Course Objectives:

The student should be able to practical of hydraulic systems and components operation

Detailed Description:

No.	Unit Title	Unit Content	Hours
1		<ul style="list-style-type: none"> Hydrostatic system. Main components of hydrostatic system compare hydraulic diagrams to system machine 	
2		<ul style="list-style-type: none"> Torque Converter. Main components disassembly and assembly of main components 	
3		<ul style="list-style-type: none"> hydraulic transmission for(D966) Main components of hydraulic transmission test type hydraulic transmission, disassembly and assembly of gearbox 	
4		<ul style="list-style-type: none"> Hydraulic systems of (D7G)Cat Main components compare hydraulic diagrams to system machine operating systems, test type systems 	
5		<ul style="list-style-type: none"> Hydraulic systems of chieftain Main components, function hydraulic diagrams to system machine how operating the systems, system test methods 	
6		<ul style="list-style-type: none"> Hydraulic systems of M88A1Main components, compare hydraulic diagrams to systems machine operating systems 	
7		<ul style="list-style-type: none"> Hydraulic system of (FMTV) Main components compare hydraulic diagrams to systems machine operating system, troubleshooting 	

No.	Unit Title	Unit Content	Hours
		of hydraulic systems	
8		<ul style="list-style-type: none">Hydraulic systems of (HEMTT) Main components, operating systems, troubleshooting of hydraulic systems	

Teaching Methods:

1. Laboratory

Books and references:

1. TMG 2350-256-34-2
2. SEME ARUCHIEETAIN FV4204 hydraulic pinch
3. Fluid power hand book
4. Wheel loader shop manual(A66D CAT)
5. D7G Tractor shop manual CAT
6. الهندسية المعدات كراسة
7. الشيفتين الأنقاذ لونش الهيدروليكا النظام كراسة
6. كراسة النظام الهيدروليكي لآلية FMTV
7. كراسة النظام الهيدروليكي لآلية HEMMIT

Associate Degree Program

Specialization	Electro- Hydraulic and pneumatic Systems Of Heavy Vehicle
Course Number	020306151
Course Title	Heavy Duty Vehicles Transmission and Suspension Systems
Credit Hours	2
Theoretical Hours	2
Practical Hours	0

Short Description:

Introduction types of gears planetary gear sets and its laws fluid couplings & torque converters clutches for planetary gear sets engagement automatic transmission integrated gear boxes: power transmission steering – braking in on unit hydraulic circuits controlling gear boxes lubrication system troubleshooting. Suspension systems for heavy –duty vehicles: components types of suspension, trouble shooting.

Course Objectives:

This course aims at:

After presenting this course the student should : classify types of gears, gear trains, torque converters, how different types of hydraulic and automatic transmission mounted on heavy armored vehicles operate, braking systems integrated inside gearbox, steering units integrated also inside gearbox operate and the different types of steer units and their operation. Different suspension units, operation and components .how to troubleshoot different ferules.

Detailed Description:

No.	Unit Title	Unit Content	Hours
1	GEER Trains	<ul style="list-style-type: none"> • Type of gears, gear ratio, gee trains, planetary gear set, components, operation, ratio calculations • Fluid coupling • Torque converter 	
2	Hydraulic and automatic transmission gear system	<ul style="list-style-type: none"> • Principle of operation • Cross drive, components, gear trains, shafts • Wet clutches • Relationship between gear groups and clutches • Different speed operation, shift 	
3	Steer units	<ul style="list-style-type: none"> • Introduction • Principle of operation • The relationship between the gear trains and the steer unit inside • the hydraulic gear unit • Steer units using clutches, components, principle of operation, steer on different speeds relation ship between final gear train components and steer unit • Hydro-static- steer unit: components, principle of operation, variable displacement pumps, 	

No.	Unit Title	Unit Content	Hours
		hydraulic motors, steer unit operation inside the gear box, relationship between final gear train components and steer unit	
4	Brake System	<ul style="list-style-type: none"> • Introduction • Principle of operation • Brake system inside gear unit • Relationship between final drive unit inside cross drive hydraulic gear unit and brake system • Clutches, plates, activation, boost hydraulic pumps • Operation of brake system inside gear box unit 	
5	Hydraulic systems for gear box	<ul style="list-style-type: none"> • Introduction • Principles • Pumps, types, parts, operation of different types of pumps • Valves: pressure regulation valves, flow control valves, spool valves • Actuators, different types of actuators, special actuators for hydraulic gear box units, • Hydraulic circuit • Control circuit • Hydraulic circuit for gear box unit 	

No.	Unit Title	Unit Content	Hours
6	Suspension systems for armor vehicles	<ul style="list-style-type: none">• Introduction• Suspension system using oil dampers• Types of oil dampers• Springs: types, torsion bars, spiral, leaf springs• Suspension as a unit for armored vehicles• Hydro-Gas suspension units: operation principle, components, charging with nitrogen and oil, pressures of nitrogen• Track system operation, components, Idle wheel, track carriers, spur track wheel Calibration	

Teaching Methods:

-Lectures, Power point presentation, Discussion

Books and references:

Text Books & References:

Textbook:

1. TM92350253-20P

References:

1. AESP2350-p-100-302/522/523

2. TM92300-257-35

3. TM92350253-20P

Associate Degree Program

Specialization	Electro- Hydraulic and pneumatic Systems Of Heavy Vehicle
Course Number	020306152
Course Title	Heavy Duty Vehicles Transmission and Suspension Systems workshops
Credit Hours	1
Theoretical Hours	0
Practical Hours	3

Short Description:

Practicing on transmission & suspension systems for different types of heavy duty vehicles (tanks): disassembling the transmission units and assembling it back, troubleshooting & repairs, applying preventive maintenance, disassembling the different components of suspension units and assembling it back, charging with Nitrogen and oil troubleshooting & repairs, applying.

Course Objectives:

By the end of this course students are expected to be able to:

1. troubleshooting of transmission hydraulic system of heavy vehicles
2. troubleshooting of suspension system of heavy vehicles
3. calibrating of suspension system of heavy vehicles
4. assembling and dis assembling of suspension system and suspension hydraulic systems
5. Hydraulic fluid types used in system
6. hydraulic clutch troubleshooting

For (For M88 , M109,M108 , cheaften ,M113A3 vehicles) heavy vehicle

Detailed Description:

No.	Unit Title	Unit Content	Hours
1	Torque transmission	<ul style="list-style-type: none">• Torque converter removal and replace• Torque converter troubleshooting For M88 , M109,M108 , cheaften ,M113A3 vehicles	
2	Hydraulic fluid	<ul style="list-style-type: none">• Hydraulic fluid refill and examine	
3	Hydraulic circuit chart	<ul style="list-style-type: none">• Hydraulic system circuit following	
4	Suspension system	<ul style="list-style-type: none">• Suspension system(calibrating, removing , assembling)	
5	Hydraulic machines	<ul style="list-style-type: none">• Hydraulic pumps (removing , assembling , trouble shooting)	
6	Hydraulic actuators	<ul style="list-style-type: none">• Wet clutch examining and troubleshooting and assembling	

Teaching Methods:

-lab .

Books and references:

Text Books & References:

Textbook:

1. TM92350253-20P

References:

1. AESP2350-p-100-302/522/523

2. TM92300-257-35

3. TM92350253-20P

Associate Degree Program

Specialization	Electro- Hydraulic and pneumatic Systems Of Heavy Vehicle
Course Number	020306121
Course Title	Hydraulic and pneumatic Systems basics
Credit Hours	3
Theoretical Hours	3
Practical Hours	0

Short Description:

. Basic of hydraulic system , symbols and circuited and components pumps , oils , valves , actuators , filters , reservoirs , tubing , accumulators , circuits hydraulic systems

Course Objectives:

Upon the completion of the course, the student will be able to:

1. Introduction of hydraulic system.
2. Define and discuss pumps ,oils , valves , actuators , filters and circuits hydraulic system
3. hydraulic machines and actuators types

Detailed Description:

No.	Unit Title	Unit Content	Hours
1		<ul style="list-style-type: none"> Introduction , Definitions , Advantages Disadvantage tags of hydraulic system Applications of hydraulic systems 	
2		<ul style="list-style-type: none"> Reservoir (Oil tank) 	
3		<ul style="list-style-type: none"> Hydraulic pumps. pomp class reaction an Applications of different types of pumps 	
4		<ul style="list-style-type: none"> Hydraulic Oils. Oil properties , Technical specifications , Fluid storage 	
5		<ul style="list-style-type: none"> Hydraulic Valves. cheek valves , flow control valves , Directional control valves , Solenoid for directional control valves , pressure control valves 	
6		<ul style="list-style-type: none"> Hydraulic Actuators. Hydraulic cylinders ,Hydraulic Motors 	
7		<ul style="list-style-type: none"> types of filter 	
8		<ul style="list-style-type: none"> oil coolers usage and heat exchangers 	
9		<ul style="list-style-type: none"> Hydraulic power lines .Basic requirements, Material of fluid lines hose installation ,pipes fittings Connectors 	
10		<ul style="list-style-type: none"> Seals of fluid power equipment types 	
11.		<ul style="list-style-type: none"> Pneumatic systems components Types of compressor ,valves , 	



No.	Unit Title	Unit Content	Hours
		tanker , circuits pneumatic systems	

Teaching methods

_ Lectures

References and books :

1. Amatol: lab Manvel's on hydraulic.
2. Alto's General catalog: 19995.
3. Bosch "Hydraulic in theory and practice "1995.
4. Fest Didactic "Hydraulics Basic Level Course" 1990.
5. He hn , Anton H ."Fluid power Troubleshooting" . MARCEL DEKKER

Associate Degree Program

Specialization	Electro- Hydraulic and pneumatic Systems Of Heavy Vehicle
Course Number	02036261
Course Title	Hydraulic Systems troubleshooting
Credit Hours	3
Theoretical Hours	3
Practical Hours	0

Short Description:

. troubleshoot of hydraulic system , following hydraulic systems , oils , valves , actuators , filters , reservoirs , tubing , accumulators , circuits hydraulic systems

Course Objectives:

Upon the completion of the course, the student will be able to:

1. troubleshoot of hydraulic system.
2. diagnose and discuss the fault of pumps ,oils , valves , actuators , filters and hydraulic circuits
3. find the malfunction causes of hydraulic systems

Detailed Description:

No.	Unit Title	Unit Content	Hours
1		<ul style="list-style-type: none"> Introduction , Definitions Applications of hydraulic systems 	
2		<ul style="list-style-type: none"> Reservoir (Oil tank) leakage ,low level reasons 	
3		<ul style="list-style-type: none"> Hydraulic pumps classifications and malfunctions 	
4		<ul style="list-style-type: none"> Hydraulic Oils. Oil properties , Technical specifications test 	
5		<ul style="list-style-type: none"> Hydraulic Valves. cheek valves , flow control valves , Directional control valves , Solenoid for directional control valves , pressure control valves malfunction and troubleshooting 	
6		<ul style="list-style-type: none"> Hydraulic Actuators. Hydraulic cylinders ,Hydraulic Motors motive power and malfunction 	
7		<ul style="list-style-type: none"> Effect of dirt on hydraulic compounds. Types of contamination , Tasks of hydraulic Fillers. Characteristics of filter elements ,Degree of separation 	
8		<ul style="list-style-type: none"> Oil coolers :Cooling methods ,Types of heat Exchangers , Selection of heat Exchangers 	
9		<ul style="list-style-type: none"> charging of accumulators applications of accumulators 	
10		<ul style="list-style-type: none"> Seals of fluid power equipment. Dynamic seal applications , static 	

No.	Unit Title	Unit Content	Hours
		seal application checking for leaks	
11.		<ul style="list-style-type: none">Hydraulic circuits. circuits design , Examples of Hydraulic control circuits	
12.		<ul style="list-style-type: none">Pneumatic systems circuits design	

Teaching methods

_ Lectures

References and books :

1. Amatol: lab Manvel's on hydraulic.
2. Alto's General catalog: 19995.
3. Bosch "Hydraulic in theory and practice "1995.
4. Fest Didactic "Hydraulics Basic Level Course" 1990.
5. He hn , Anton H ."Fluid power Troubleshooting" . MARCEL DEKKER INC .1995
6. كراسة أساسيات تشخيص الأعطال الهيدروليكية

Associate Degree Program

Specialization	Electro- Hydraulic and pneumatic Systems Of Heavy Vehicle
Course Number	020306122
Course Title	Hydraulic and pneumatic Systems basics lab
Credit Hours	1
Theoretical Hours	
Practical Hours	3

Short Description:

. Practicing on the hydraulic systems recognizing and differentiation between : pumps, actuator, filter, control valves, pressure valves, flow metering valves Disassembling of hydraulic component

Course Objectives:

Upon the completion of the course, the student will be able to:

1. Introduction of hydraulic system
2. Define and discuss pumps ,oils , valves , actuators , filters and circuits hydraulic system

Detailed Description:

No.	Unit Title	Unit Content	Hours
1		<ul style="list-style-type: none">• Practicing on the hydraulic systems . and application of hydraulic system	
2		<ul style="list-style-type: none">• Practicing on the hydraulic systems oil tank and hydraulic pump	
3		<ul style="list-style-type: none">• Practicing on the hydraulic system hydraulic oils and valves	
4		<ul style="list-style-type: none">• Practicing on the hydraulic system actuators. Filters, power lines, accumulators. Seals	
5		<ul style="list-style-type: none">• Practicing on the hydraulic system circuits, pneumatic system.	

Teaching method :-

-Laboratory

Text Books & References:

1. Amatol lab Manvel's on hydraulic.
2. Alto's General catalog: 19995.
3. Bosch "Hydraulic in theory and practice "1995.
4. Fest Didactic "Hydraulics Basic Level Course" 1990.
5. He hn , Anton H ."Fluid power Troubleshooting". MARCEL DEKKER INC .1995
6. دراسة أساسيات تشخيص الأعطال الهيدروليكية

Associate Degree Program

Specialization	Electro- Hydraulic and pneumatic Systems Of Heavy Vehicle
Course Number	020306262
Course Title	Hydraulic Systems troubleshooting lap
Credit Hours	1
Theoretical Hours	0
Practical Hours	3

Short Description:

. Practicing on the hydraulic systems diagnoses and maintenance : pumps, actuator, filter, control valves, pressure valves, flow metering valves,
For (heavy vehicles)

Course Objectives:

Upon the completion of the course, the student will be able to:

1. troubleshoot of hydraulic system malfunctions
2. diagnoses of pumps ,oils , valves , actuators , filters and circuits hydraulic system

Detailed Description:

No.	Unit Title	Unit Content	Hours
1		<ul style="list-style-type: none"> Practicing on the hydraulic systems .following hydraulic circuits diagrams 	
2		<ul style="list-style-type: none"> Diagnoses of oil prosperities and contaminants 	
3		<ul style="list-style-type: none"> hydraulic systems leakage of oil tank , hydraulic pump , hydraulic tube , finding causes . 	
4		<ul style="list-style-type: none"> following hydraulic circuit of M109 vehicle systems 	
5		<ul style="list-style-type: none"> following hydraulic circuit of M110 vehicle systems 	
6		<ul style="list-style-type: none"> . following hydraulic circuit of M88 vehicle systems 	
7		<ul style="list-style-type: none"> following hydraulic circuit of cheafen vehicle systems 	
8		<ul style="list-style-type: none"> Troubleshooting of hydraulic component malfunction (filter ,hose .tube ,pump ,actuator ,valves and heat exchanger). 	

Teaching method :-
-Laboratory

Text Books & References:

1. Amatol lab Manvel's on hydraulic.
2. Alto's General catalog: 19995.
3. Bosch "Hydraulic in theory and practice "1995.
4. Fest Didactic "Hydraulics Basic Level Course" 1990.
5. He hn , Anton H ."Fluid power Troubleshooting". MARCEL DEKKER INC .1995
6. كراسة أساسيات تشخيص الأعطال الهيدروليكية