



Engineering Program

Specialty	Mechanics of Heavy Vehicles
Course Number	20205221
Course Title	Diesel Engines
Credit Hours	(2)
Theoretical Hours	(2)
Practical Hours	(0)



❖ تطبق هذه الخطة الدراسية اعتباراً من بداية العام الجامعي 2009/2008

Brief Course Description:

- ❖ Introduction, specifications, components & types of heavy-duty diesel engines, tow stroke, four stroke, water cooled, air-cooled, shape in line cylinders, v-shape (6-v, 8-v, 12-v) cylinders, fuel systems air supplies systems, exhaust systems, lubrication systems, tuning & adjusting, applications on armor vehicles engine.

Course Objectives:

This course aims at:

1. After presenting this course the student should: classify different types of diesel engines according to their operation, specifications, applications and different types of sub-systems related to.



Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1.	Two Stroke Diesel Engines	<ul style="list-style-type: none"> ▪ Advantages and disadvantages of diesel engines ▪ Comparison between two strokes: diesel and gasoline engines ▪ Inlet air and exhaust systems, Blowers, Types of cylinders, Inlet air heating, Air box ▪ Cooling system: operation, Types and components: thermostat, fan, hoses, water pump, And water jackets ▪ Lubrication System: types and operation, components ▪ Fuel system: operation, single unit injection system, tank, fuel pipes, low pressure pump, filters 	
2.	Four Stroke Water Cooled diesel Engines	<ul style="list-style-type: none"> ▪ Engine components: Inlet air and Exhaust Systems, types of cylinders, and turbo charger ▪ Cooling system operation and components ▪ Lubrication system, types, cooling lubricant ▪ Fuel system: operation, straight in line injection pumps, tank, pipes, filters, adjustment 	
3.	Air cooled diesel engines	<ul style="list-style-type: none"> ▪ Engine components, types of cylinders, fins ▪ Advantages and disadvantages ▪ Air fans, flow of cooling air 	
4.	Fuel system	<ul style="list-style-type: none"> ▪ Fuel tanks types and specifications ▪ Fuel filters types and specifications ▪ Low pressure fuel pumps types, mechanical and electrical. ▪ Single point injection pumps, principle, operation, fuel pressure, components ▪ In-line (straight) injection pumps, principles, operation. ▪ Injectors, operation, types, components ▪ Rotary injection fuel pumps, principle, types, hydraulic head 	
5.	Trouble Shooting	<ul style="list-style-type: none"> ▪ Fault finding for different engine systems 	

❖ تطبق هذه الخطة الدراسية اعتباراً من بداية العام الجامعي 2009/2008

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, Power point presentation, Discussion

Text Books & References:

Textbook:

1. Diesel engines 2001, by phc.

References:

1. TM 2350-p-100-201
2. TM 2350-P-100-711
3. TM92350-317-34



❖ تطبق هذه الخطة الدراسية اعتباراً من بداية العام الجامعي 2009/2008



Engineering Program

Specialty	Mechanics of Heavy Vehicles
Course Number	20205222
Course Title	Diesel Engines Workshops
Credit Hours	(1)
Theoretical Hours	(0)
Practical Hours	(3)



❖ تطبق هذه الخطة الدراسية اعتباراً من بداية العام الجامعي 2009/2008

Brief Course Description:

- ❖ Practicing on armor vehicle engines, starting on the vehicles & switching it off dismounting the power pack off the vehicle & mounting it back, recognizing the external & internal components disassembling the engines and assembling it, following the systems on the engine, practicing tuning & adjustment practicing preventive maintenance.

Course Objectives:

This course aims at:

1. After this work shop the students should be able to :
2. Identify the diesel engines components
3. Mounting and dismounting the engines of the vehicles
4. Disassemble and assemble engines
5. Tuning
6. Troubleshooting



❖ تطبق هذه الخطة الدراسية اعتباراً من بداية العام الجامعي 2009/2008

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1.	Vehicles Using Two Stroke Diesel Engines:	<ul style="list-style-type: none"> Dismounting the power pack off the vehicle & mounting it back, recognizing the external & internal components, disassembling the engines and assembling it following the systems on the engine, practicing tuning & adjustment, and practicing preventive maintenance 	
2.	Vehicles Using Four Stroke –Water cooled Diesel Engines	<ul style="list-style-type: none"> Dismounting the power pack off the vehicle & mounting it back, recognizing the external & internal components, disassembling the engines and assembling it, following the systems on the engine, practicing tuning & adjustment and practicing preventive maintenance 	
3.	Vehicles Using Four Stroke –Air cooled Diesel Engines	<ul style="list-style-type: none"> Dismounting the power pack off the vehicle & mounting it back, recognizing the external & internal components disassembling the engines and assembling it, following the systems on the engine, practicing tuning & adjustment practicing preventive maintenance 	



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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:

- ❖ Lecture, Laboratory

Text Books & References:

Textbook:

1. Diesel engines 2001, by phc.

References:

1. TM 2350-p-100-201
2. TM 2350-P-100-711
3. TM92350-317-34



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Engineering Program

Specialty	Mechanics of Heavy Vehicles
Course Number	20208211
Course Title	Heavy Duty Vehicles Transmission and Suspension Systems
Credit Hours	(2)
Theoretical Hours	(2)
Practical Hours	(0)



❖ تطبق هذه الخطة الدراسية اعتباراً من بداية العام الجامعي 2009/2008

Brief Course 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 Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1.	GEER Trains	<ul style="list-style-type: none"> ▪ Type of gears, gear ratio, gear 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, 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 	

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		<ul style="list-style-type: none"> ▪ 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 	
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 	

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, Power point presentation, Discussion

Text Books & References:

Textbook:

1. TM92350253-20P

References:

1. AESP2350-p-100-302/522/523
2. TM92300-257-35
3. TM92350253-20P



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