Agriculture, Food and Natural Resources

Pathway: Power, Structural & Technical Systems

Code	Topic	Course	Knowledge and Skill	Performance Element	Measurement Criteria
AGPD01.01	Science	#2: Introduction to Power, Structural and Technical Systems #4: Power Systems #5: Internship in Power, Structural and Technical Systems #6: Power, Structural and Techinical Systems	Apply physical science principles to engineering applications with mechanical equipment, structures, biological systems, land treatment, power utilization, and technology.	Relate power generation to energy sources.	Identify petroleum sources (e.g., gasoline, diesel).
					Identify alternative sources (e.g., ethanol, biodiesel, air, wood, geothermal, solar).
					Compare environmental impact of energy sources.
					Compare efficiency of energy source.
					Compare characteristics of energy sources.
					Discuss efficiency of systems (e.g., fuel cells, chemical, wind, hydro, nuclear, electric, mechanical, solar, biological).
				Apply principles of lubricants to sort and classify lubricants.	Classify lubricants and determine applications.
					Identify viscosity and strengths of lubricants.
					Describe properties of lubricants.

Code	Topic	Course	Knowledge and Skill	Performance Element	Measurement Criteria
AGPD02.01	Power	#2: Introduction to Power, Structural and Technical Systems #4: Power Systems	Apply principles of operation and maintenance to mechanical equipment, structures, biological systems, land treatment, power utilization, and technology.	Perform scheduled service routines to maintain machinery and equipment.	Lubricate machinery and equipment.
					Ensure presence and function of safety systems and hardware.
					Service electrical systems.
					Perform machine adjustments (e.g., belts, drive chains).
					Service filtration systems.
					Maintain fluid levels.
					Maintain vehicle, machinery and equipment cleanliness and appearance.
					Maintain fluid conveyance components, (e.g., hoses and lines, valves, nozzles).
					Design a preventive maintenance schedule.
					Identify causes of malfunctions and failures.
					Calibrate metering, monitoring, and sensing equipment.
				Observe rules of the road to operate machinery and equipment.	Describe function of machine controls and instrumentation.
					Perform appropriate start-up procedures.
					Select proper machine(s) for specific task(s).
					Safely operate equipment.
					Perform pre-operation inspection.
					List applicable laws for on- and off-highway operation.

Code	Topic	Course	Knowledge and Skill	Performance Element	Measurement Criteria
AGPD02.02	Power	#2: Introduction to Power, Structural and Technical Systems #4: Power Systems	Apply principles of service and repair to mechanical equipment, structures, biological systems, land treatment, power utilization, and technology.	Troubleshoot problems and evaluate performance to service and repair the components of internal combustion engines.	Describe principles of operation.
					Identify engine systems and components.
					Analyze and troubleshoot engine.
					Perform overhaul procedures.
					Evaluate engine performance through post-rebuild testing.
				Follow manufacturers' guidelines to service and repair power transmission systems.	Describe features, benefits, and applications of various power transmission systems.
					Describe principles of operation of various power transmission systems.
					Perform calculations involving speed, torque and power relationships.
					Describe features, benefits, and applications of mechanical transmission components (e.g., belts, chains, gears, bearings, seals, universals).
					Inspect, analyze, and repair hydrostatic transmissions.
					Inspect, analyze, and repair differentials and final drives.
					Inspect, analyze, and repair clutches and brakes.
					Inspect, analyze, and repair gear-type transmissions including power shift.
					Inspect, analyze, and repair auxiliary drives.

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			(CONTINUED)	Evaluate performance and check maintenance manuals to service and repair hydraulic systems.	Describe features, benefits, and applications of types of hydraulic systems.
					Describe physical principles of operation.
					Interpret symbols and schematic drawings.
					Describe the application and operation of major components.
					Inspect, analyze, and repair hydraulic components (e.g., pumps, valves).
					Inspect, analyze, and repair fluid conveyance components (e.g., hoses, lines).
					Evaluate system cleanliness.
					Identify hydraulic fittings and ports.
				Troubleshoot from schematics to service vehicle electrical systems.	Describe features and applications of electrical systems.
					Interpret symbols and wiring diagrams.
					Test and troubleshoot electrical systems and components (e.g., battery, charging, starting, lighting, instrumentation, accessories).
					Troubleshoot and install instrumentation and data acquisition system (e.g., Global Positioning System (GPS), spraying, planting, harvesting monitors).
					Diagnose and repair control systems and sensors (e.g., engine, transmission, implement).

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			(CONTINUED)	Use company diagrams and schematics to service vehicle heating and air conditioning systems.	Describe physical principles of operation.
					Interpret symbols and diagrams.
					Test, troubleshoot, and replace heating and air-conditioning components (e.g., compressor, expansion valve, receiver dryer, pump, hoses).
					Evacuate and charge air conditioning systems.
				Check performance parameters to service and repair steering, suspension, traction, and vehicle performance systems.	Evaluate traction, ballasting, and weight transfer.
					Evaluate vehicle stability.
					Determine optimum vehicle performance, e.g., horsepower management, fuel efficiency.
					Troubleshoot, adjust, and repair suspension systems.
					Inspect and repair steering systems.
				Use tools in the workplace to demonstrate safe use and proper skills with construction/fabrication hand tools.	Demonstrate proper use of measurement and layout tools.
					Apply proper use of measurement and layout tools in construction/fabrication of an actual project.
					Demonstrate safe and proper techniques in using hand and power tools in construction/fabrication.
					Demonstrate hand and power tool use to construct/fabricate an actual project according to blueprints or plans.
					Identify and demonstrate proper hand and power tool maintenance procedures.

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AGPD03.01	Structural Systems	#3: Structural Systems	Exercise basic skills in blueprint and design development to create sketches, drawings and plans.	Use computer skills to develop simple sketches and plans.	Use current technology to develop simple plans and sketches.
					Identify symbols and drawing techniques used to develop simple plans and sketches.
					Use scale measurement and dimension to develop simple plans and sketches.
AGPD03.02	Structural Systems	#3: Structural Systems	Read and relate structural plans to specifications and building codes.	Examine blueprints and local codes to develop a logical construction plan.	Identify parts of a plan or blueprint.
					Identify criteria for different views of a plan or blueprint.
					Locate elements of a construction plan and develop a construction plan.
					Identify local code enforcement agencies and procedures.
					Read and interpret local code information.
					Complete permit applications.
AGPD03.03	Structural Systems	#3: Structural Systems	Examine structural requirements to estimate project costs.	Use bids and billing information to develop a complete materials list and project cost estimate.	Identify materials used in agricultural construction/fabrication.
					Explain proper criteria for material use.
					Identify elements of project cost estimate (materials, labor, administrative, etc.).
					Explain selection process of all construction materials.
					Estimate and select type and quantities of material and other costs associated with a specified project plan.
					Prepare a bid package for a planned project.

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AGPD03.04	Structural Systems	#3: Structural Systems	Develop skills required to use construction/ fabrication equipment and tools.	Use tools in the workplace to demonstrate safe use and proper skills with construction/fabrication hand tools.	Demonstrate proper use of measurement and layout tools.
					Apply proper use of measurement and layout tools in construction/fabrication of an actual project.
					Demonstrate safe and proper techniques in using hand and power tools in construction/fabrication.
					Demonstrate hand and power tool use to construct/fabricate an actual project according to blueprints or plans.
					Identify and demonstrate proper hand and power tool maintenance procedures.
AGPD03.05	Structural Systems	#3: Structural Systems	Plan, implement, manage, and/or provide support services to facility design and construction; equipment design, manufacture, repair, and service; and agricultural technology.	Design machinery and equipment including vehicles, implements, building, and facilities (e.g., feeding, feed storage).	Analyze site/equipment/permit requirements.
					Develop drawings.
					Estimate material needs and costs.
					Operate Computer Aided Drafting Design (CADD) Software.

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			(CONTINUED)	Follow architectural and mechanical plans to construct buildings and facilities.	Identify and select appropriate building materials.
					Install plumbing equipment and fixtures.
					Construct with wood and metal.
					Install electrical wiring components and fixtures.
					Paint or protect with coatings.
					Insulate facility.
					Install fencing.
					Install glass, ridged plastic panels and/or film plastic.
					Construct with concrete, stone, and brick.
AGPD04.01	Technical Systems	#8: Advanced Applications of Technical Systems	Use the variety of tools available in computer systems to accomplish fast, accurate production in the workplace.	Identify and explain various types of hardware systems to show their applications potential.	Identify and describe individual components of each system.
					Discuss various types of diagnostic equipment.
					Be able to show aptitude in use of various equipment.
					Demonstrate competency on cable through put and set up.
AGPD04.02	Technical Systems	#7: Technical Systems	Use available power sources to plan and apply control systems.	Measure with selected instruments to demonstrate knowledge of basic electricity.	Show proficiency in use of various meters.
					Discuss importance of and techniques for grounding.
					Show understanding of codes and regulations.
					Discuss various energy sources.

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			(CONTINUED)	Reference electrical drawings to design, install, and troubleshoot control systems.	Develop and read schematic drawings for a control system.
					Identify and describe uses of various components of control systems; i.e., transistors, relays, HVAC, logic controllers.
					Discuss the importance of maintenance schedules.
					Identify system performance problems and apply troubleshooting techniques.
AGPD04.03	Technical Systems	#8: Advanced Applications of Technical Systems	Explain geospatial technology to demonstrate its applications.	Employ appropriate techniques to demonstrate application of GIS/GPS systems principles.	Explain the concept and principles.
					Describe equipment.
					List techniques used.
					Explain the application of GIS/GPS systems with map development output.
				Use computer applications to produce maps that reflect surveying and mapping principles.	Understand and use various equipment.
					Perform survey and produce map using computer techniques.
				Select an area of personal expertise to demonstrate knowledge of end applications.	Apply knowledge and experience to a specific application or project to show competency; i.e., calibration, volumetric controlling, electrical design.