Refrigeration and Airconditioning Work - National Technical Certificate (NTC) and Advanced National Technical Certificate (ANTC)

Refrigerant Work

PROGRAMME: ADVANCED NATIONAL TECHNICAL CERTIFICATE IN REFRIGERATION & AIR-CONDITIONING WORK			
Course: CAR 24 - TRANSPORT REFRIGERATION		**Course Code: CAR 24**	**Contact Hours 48 - 2hr/wk (1-1)**
Course Specification: Theoretical Content			
	General Objective 1.0: Understand the Principles of Operation of Transport Refrigeration Equipment		
Week	**Specific Learning Outcome:**	**Teachers Activities**	**Resources**
1-6	1.1 Identifying and describing the various types and working principles of transport refrigeration equipment as used in aeroplanes, trains, marine vessels trucks etc 1.2. Identify the various components within the system as well as explaining their functions		
	1.3 Identify types and working principles of transport refrigeration equipment used in aeroplane, train, marine, vessels, trucks, etc. 1.4 Identify various component within the system. 1.5 Explain the function of each component. 1.6 Sketch the essential parts of the equipment.	• Ask the students to: • Intemise the major differences between a normal refrigeration system and transport refrigeration system • Identify the various components of a transport refrigeration system in aeroplane, train, marine vessels, trucks etc.	• Lesson plan • Chalkboard • Transport refrigeration equipment of aeroplane, train, truck, marine, vessels, etc.

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Course Specification: Theoretical Content			
	General Objective: 2.0 Install and Commission Common Brands of Transport Refrigeration Equipment.		
Week	**Specific Learning Outcome:**	**Teachers Activities**	**Resources**
7-10	2.1 Interpret the layout of any transport refrigeration 2.2 Install and commission any of the equipment 2.3 Service and repair any of the equipment 2.4 Test and certify any of the equipment or a component sub assembly		
	2.4 Interpret the layout diagram of a transport refrigeration for trucks, aeroplane, trains, etc. 2.6 Install the equipment - connect compressors condenser, diesel engine, etc. 2.7 Wire the circuit 2.8 Pressure test the system 2.9 Pull vacuum and charge the system 2.10 Commission the system.	• Ask the students to sketch and interpret the layout diagram of a transport refrigeration system • Ask the students to sketch and interpret the layout diagram of a transport refrigeration system	• Lesson Plan • Chalkboard • Layout diagram • Compressors • Condenser • Diesel engine, etc. • Vacuum pump • Gauge set o Hand tools e.g. sucket set, Ratchet set, etc.
	General Objective: 3.0 Diagnose faults in Common Brands of Transport Refrigeration Equipment and Repair them.		
Week	**Specific Learning Outcome:**	**Teachers Activities**	**Resources**
11-12	3.1 Locate and amend points of leakage using electronic or halide leak detector 3.2 Top up the system using correct 3.3 Adjust various control in the system, fan belt, speed control, etc. Start the diesel engine and repair simple faults.		• Faulty air conditioned port • Test equipment • Tool box • Protective clothing etc.

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Course Specification: Theoretical Content			
	General Objective: 4.0 Service Transport Refrigeration Equipment.		
Week	**Specific Learning Outcome:**	**Teachers Activities**	**Resources**
13-15	4.1 Interchange the power supply where necessary from AC to DC and vice versa. 4.2 Bleed the diesel injector 4.3 Defrost the system i.e. hot gas. 4.4 Clean and top up diesel engine with oil and the radiator with water.	• Ask the students to intercharge the power supply from AC to DC and vice Versa	
	General Objective: 5.0 Understand the Principles of Marine Refrigeration		
Week	**Specific Learning Outcome:**	**Teachers Activities**	**Resources**
16-19	5.1 Explain the principles of operation of marine refrigeration system 5.2 Identify essential parts of the plant equipment, viz: compressor, marine condenser, evaporator ice making unit, drinking water cooler, expansion valve, condenser, water regulating valve, temperature control switches, drier, strainers, motor and controls. 5.3 Explain the function of each component of th system listed in 5.2 above 5.4 Interpret the installation instruction and be able to install marine refrigeration system in a vessel.	• Ask the students to embark on an excursion to witness transport equipment.	• Lesson Plan • Chalkboard • Marine equipment
	General Objective: 6.0 Diagnose and Rectify faults in Marine Refrigeration System.		
Week	**Specific Learning Outcome:**	**Teachers Activities**	**Resources**
20-21	6.1 Diagnose faults in the system, i.e. shortage of regrigerant, faulty expansion/regulating valves. 6.2 Effect repairs on all types of faults; faulty compressor motor. 6.3 Adjust control switches, expansion valves, regulating valves.		• Lesson Plan • Chalkboard • Vacuum pump • Gauge set • Hand tools e.g. sucket set, ratchet set, etc.

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Course Specification: Theoretical Content			
	General Objective 7.0: Service Marine Refrigeration System		
Week	Specific Learning Outcome:	Teachers Activities	Resources
22-24	7.1 Ensure that all the refrigeration controls are in good order 7.2 Check the oil level of the compressor 7.3 Clear the condenser with suitable chemical i.e. marine condenser 7.4 Observe all safety precaution as regards the handling of ammonia refrigerant (high pressure and gas leakage), etc.	EVALUATION: • Questions and Answers • Written tests • End of module examination.	

PROGRAMME: ADVANCED NATIONAL TECHNICAL CERTIFICATE IN REFRIGERATION & AIR-CONDITIONING WORK			
Course: CAR 25 - REFRIGERATION WORK		**Course Code: CAR 25**	**Contact Hours** 36 - 1hr/wk (1-0)
Course Specification: Theoretical Content			
	General Objective: 1.0 Understand the Working Principles of Refrigeration Equipment in the Food Industry		
Week	**Specific Learning Outcome:**	**Teachers Activities**	**Resources**
1-8	1. Identify, describe and state the application of the various types of refrigeration equipment used in the food industry 2. Explain the working principles of each type and 3. describe the functions of the main components		
	1.1 Identify and state the application of the various types of refrigeration equipment used in food industry, freezers - sharp, blast, immersion soda fountains, beverage coolers, etc. 1.2 Explain the working principles of various types of refrigerating equipment listed in item 1.1 above. 1.3 Describe the function of the main component/parts, e.g. non-return valve (NRV) magnetic vlaves, pressure-regulating valve, of the refrigeration system.	• Ask the students to use diagrams to illustrate the operations of these components e.g. Non-return valves, magnetic valves, etc.	• Lesson plan • Chalkboard • Commercial • Refrigeration training unit • Ice plant • Magnetic Valve • Non Return Valve, etc.

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Course: CAR 25 - REFRIGERATION WORK		**Course Code: CAR 25**	**Contact Hours** 36 - 1hr/wk (1-0)
Course Specification: Theoretical Content			
	General Objective: 2.0 Install, commission and maintain a Refrigeration System		
Week	**Specific Learning Outcome:**	**Teachers Activities**	**Resources**
	2.1 Be able to interpret the layout diagrams of the system 2.2 Install and commission the equipment as well as maintain same with ease and confidence 2.3 Trouble shoot, service, repair and test the equipment or component parts thereof using appropriate tools and test equipment 2.4 apply all relevant safety precautions while effecting repairs 2.5 Prepare and interpret log sheet for the system 2.6 Interpret the layout diagram and detailed specifications of the refrigeration equipment 2.7 Install and commission the machine 2.8 Maintain refrigeration equipment with facility 2.1 Clean the condensers and defrost the evaporators 5. Interpret the colour coding for various gases used in the refrigeration equipment.	• Teacher to demonstrate and students to practice	• Layout diagram • Lesson plan • Chalkboard • Refrigeration • Training unit • Log sheets • Excursion • R.12, R.22, etc • Gauge set • Sucket set, etc.

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Course Specification: Theoretical Content			
	General Objective: 3.0 Diagnose faults in Refrigeration Equipment/System and rectify them.		
Week	**Specific Learning Outcome:**	**Teachers Activities**	**Resources**
17-24	3.1 Trouble shoot faults in a refrigeration equipment/system by: a. testing b. recognizing symptoms such as shortage of refrigerants in the system, air in the system, condenser, water too hot, etc. 3.2 Remove, dismantle, re-assemble and install faulty components in a refrigeration system. 3.3 Diagnose and rectify faults in a refrigerant system 3.4 Apply all relevant safety precautions while effecting repairs to faults in a refrigeration system. 3.5 Prepare as well as interpret log sheet for the refrigeration system, temperature and pressure, etc.	**EVALUATION:** • Questions and Answers • Written Tests • End of module examination.	