U.S.C.G. Merchant Marine Exam

QMED

Q803 Refrigerating Engineer

(Sample Examination)
Choose the best answer to the following Multiple Choice Questions

1. Under what circumstances could equipment be operated when tagged with DANGER tags?
   - (A) Whenever there is a break in the actual maintenance activity.
   - (B) Whenever permission is granted by your supervisor.
   - (C) Whenever you feel that it is safe to do so.
   - (D) Under NO circumstances should the equipment be operated when tagged.

   If choice D is selected set score to 1.

2. A dial indicator is used to measure __________.

   - (A) shaft eccentricity
   - (B) torque of a shaft
   - (C) scribed layout lines on vertical surfaces
   - (D) positive readings only

   If choice A is selected set score to 1.

3. What is the color-coding for a storage container of R-134a refrigerant?

   - (A) grey
   - (B) green
   - (C) light blue
   - (D) purple

   If choice C is selected set score to 1.

4. Excessive, prolonged oil foaming in the crankcase of a refrigeration compressor can result in what condition?

   - (A) overheated compressor bearings
   - (B) carbon deposits on the compressor piston rings
   - (C) excessively high lube oil viscosity
   - (D) wax crystals forming in the thermal expansion valve

   If choice A is selected set score to 1.
5. With regard to the relative flow patterns through the tubes and the shell of single pass shell-and-tube heat exchangers, what statement is true?

- (A) In a parallel-flow heat exchanger, the flow through the tubes and the flow through the shell are in opposite directions.
- (B) In a cross-flow heat exchanger, the flow through the tubes and the flow through the shell are in opposite directions.
- (C) In a counterflow heat exchanger, the flow through the tubes and the flow through the shell are in opposite directions.
- (D) In a counterflow heat exchanger, the flow through the tubes and the flow through the shell are in the same direction.

*If choice C is selected set score to 1.*

6. What is the maximum volume to which refillable refrigeration cylinders should be filled?

- (A) 60% full
- (B) 70% full
- (C) 80% full
- (D) 90% full

*If choice C is selected set score to 1.*

7. Treatment of heat exhaustion should consist of __________.

- (A) moving to a shaded area and laying down
- (B) placing patient in a tub of cold water
- (C) bathing with rubbing alcohol
- (D) all the above

*If choice A is selected set score to 1.*

8. An arrow stamped on the valve body of a water regulating valve indicates which of the following?

- (A) direction of the flow
- (B) direction of the plunger slide
- (C) closed position
- (D) open position

*If choice A is selected set score to 1.*
9. Refrigerant entering the compressor of a refrigeration system should be in which of the following conditions?

- (A) Low-pressure liquid
- (B) High-pressure liquid
- (C) High-pressure vapor
- (D) Low-pressure vapor

*If choice D is selected set score to 1.*

10. The usual method of unloading a low-pressure air compressor at start-up is accomplished by ________.

- (A) temporarily discharging to the air receiver
- (B) the use of a precharged accumulator
- (C) holding the suction valve open
- (D) holding the discharge valve open

*If choice C is selected set score to 1.*

11. For a lubricating oil, what is the relationship between viscosity and temperature?

- (A) As the temperature of a lubricating oil increases, the viscosity of the lubricating oil may increase or decrease, depending upon the lubricant.
- (B) As the temperature of a lubricating oil increases, the viscosity of the lubricating oil decreases.
- (C) As the temperature of a lubricating oil increases, the viscosity of the lubricating oil also increases.
- (D) As the temperature of a lubricating oil varies in either direction, the viscosity of the lubricating oil remains constant.

*If choice B is selected set score to 1.*

12. Which of the following devices allows the user to remain in an oxygen deficient space for the longest period of time without interruption?

- (A) Demand-type oxygen breathing apparatus
- (B) Canister-type gas mask
- (C) Pure oxygen breathing apparatus
- (D) Direct compressed air supply

*If choice D is selected set score to 1.*
13. The primary purpose of the liquid line strainer used in a refrigeration system is to prevent dirt and scale from entering what system component(s)?

- (A) compressor and oil separator
- (B) condenser and receiver
- (C) evaporator coil piping
- (D) thermal expansion valves

*If choice D is selected set score to 1.*

14. In addition to the drive belt itself, a V-belt that is tensioned too tight will cause excessive wear to what other drive component?

- (A) the compressor drive pulley
- (B) the shaft of the prime mover
- (C) motor shaft and compressor main bearings
- (D) the prime mover drive pulley

*If choice C is selected set score to 1.*

15. While loading bulk oil, you notice oil on the water near the barge. Which of the following actions should you carry out FIRST?

- (A) Notify the Coast Guard
- (B) Search the vessel for leaks
- (C) Notify terminal superintendent
- (D) Stop loading

*If choice D is selected set score to 1.*

16. Moisture entering a typical refrigeration system will most likely produce what effect?

- (A) be removed by the liquid line strainers
- (B) cause sweating and frost on the evaporator coils
- (C) boil in the condenser
- (D) freeze in the expansion valve

*If choice D is selected set score to 1.*

17. Traditionally, which of the listed refrigerants has been more suitable than the others for use in a centrifugal refrigeration compressor?

- (A) R-11
- (B) R-12
- (C) Ammonia
- (D) Carbon dioxide

*If choice A is selected set score to 1.*
18. If the refrigeration compressor crankcase is sweating or frosting and is operating with an unusual noise, what is most likely the cause?

- (A) a shortage of refrigerant
- (B) the compressor short-cycling on the high-pressure cut-out
  - (C) liquid refrigerant returning to the compressor
- (D) the compressor running continuously

If choice C is selected set score to 1.

19. In a refrigeration system, the pressure within the power element of a thermostatic expansion valve depends directly upon what factor?

- (A) temperature in the box
- (B) compressor suction pressure
  - (C) temperature of the evaporator coil outlet
- (D) heat transferred from the saturated liquid in the evaporator

If choice C is selected set score to 1.

20. Which of the following conditions is a symptom of a person in shock?

- (A) Cold and damp
- (B) Cold and dry
- (C) Warm and dry
- (D) Warm and damp

If choice A is selected set score to 1.

21. Remote valve operators are frequently fitted with a handwheel for local operation if the motor fails. If this is so, what is the procedure for local manual control?

- (A) Just rotate the handwheel in the appropriate direction for valve operation.
- (B) First move the lever to engage the motor clutch, then rotate the handwheel.
  - (C) First move the lever to disengage the motor clutch, then rotate the handwheel.
- (D) Motor operated valves are generally not fitted with local handwheels.

If choice C is selected set score to 1.

22. When testing the low pressure cut out switch, assuming the compressor is running, what should be done to initiate the test?

- (A) stop the compressor
  - (B) close the compressor suction valve
- (C) secure the condenser
- (D) stop the circulating pump

If choice B is selected set score to 1.
23. Which health hazard term is listed on a Safety Data Sheet (SDS) to indicate that contact with the substance will freeze body tissue on contact?

- (A) Cyanosis
- (B) Cryogenic
- (C) Freeze hazard
- (D) Freon hazard

*If choice B is selected set score to 1.*

24. When the relief valve opens on a refrigeration compressor discharge line, it discharges high-pressure refrigerant vapor to what location?

- (A) suction side of the compressor
- (B) refrigerant inlet of the condenser
- (C) liquid strainer
- (D) inlet side of the evaporator

*If choice A is selected set score to 1.*

25. When securing the operation of an inert gas system, the final step should be ________.

- (A) close the flue gas isolating valve
- (B) secure the inert gas blower
- (C) close the deck isolating valve
- (D) secure the salt water supply to the scrubber

*If choice D is selected set score to 1.*

26. To prevent motor overload during start-up of a hermetically sealed centrifugal refrigeration system, what is true concerning the compressor suction gas variable inlet guide vanes?

- (A) opened until the motor is connected across the line at full voltage and current drawn is up to full load current
- (B) closed until the motor is connected across the line at full voltage and current drawn is below full load current
- (C) opened until the motor is connected across the line at full voltage and current drawn is below full load current
- (D) closed until the motor is connected across the line at full voltage and current drawn is up to full load current

*If choice B is selected set score to 1.*
27. In reclaiming recovered refrigerant, which type of contamination will the reclamation process be unable to separate?

- (A) moisture
- (B) air
- (C) mixed refrigerants
- (D) acid

*If choice C is selected set score to 1.*

28. What is one benefit of maintenance of proper air circulation in an air-conditioned cargo space?

- (A) increased moisture content
- (B) more temperature differential
- (C) reduced slime and mold
- (D) increased density of the air

*If choice C is selected set score to 1.*

29. The most important reason for taking anti-seasickness pills as soon as possible after entering a life raft is to __________.

- (A) assist in sleeping
- (B) reduce appetite by decreasing nausea
- (C) prevent loss of body moisture by vomiting
- (D) prevent impaired judgment due to motion-induced deliriousness

*If choice C is selected set score to 1.*

30. Under what conditions is a CAUTION tag installed at equipment control stations in preparation for performing maintenance or repairs?

- (A) When operation of the equipment will harm the equipment ONLY.
- (B) When operation of the equipment will endanger personnel ONLY.
- (C) When operation of the equipment will endanger personnel OR harm the equipment.
- (D) When operation of the equipment requires temporary special instructions to be provided.

*If choice D is selected set score to 1.*

31. In a refrigeration system, from what location would air and non-condensable gases be removed?

- (A) the top of the condenser purge connection
- (B) the bottom of the receiver drain connection
- (C) expansion valve equalizer connection
- (D) compressor oil fill connection

*If choice A is selected set score to 1.*
32. If the superheat value of the thermostatic expansion valve is adjusted too high, what would be the result?
   - (A) the heat removal capacity of the evaporator will increase
   - (B) the suction line of the compressor will be abnormally cold
   - (C) the evaporator will be overfed with liquid refrigerant
   - (D) the suction line of the compressor will be abnormally warm

   *If choice D is selected set score to 1.*

33. Which of the installation steps listed is necessary for the proper operation of the thermostatic expansion valve?
   - (A) Attach the thermal bulb to the suction line using plastic ties.
   - (B) Remove excess lengths of the sensing bulb capillary tube from the device to increase sensitivity.
   - (C) Clean off oxidation from the surface of the suction line and sensing bulb with fine abrasive cloth or steel wool.
   - (D) Heat shrink insulating material around the device once the bulb has been properly secured.

   *If choice C is selected set score to 1.*

34. To detect the presence of explosive gases in any space, tank, or compartment, you should use a
   - (A) detector filament
   - (B) halide torch
   - (C) flame scanner
   - (D) combustible gas indicator

   *If choice D is selected set score to 1.*

35. Which of the listed pipe sizes is not commonly used?
   - (A) 3/8 inch
   - (B) 1/2 inch
   - (C) 5/8 inch
   - (D) 3/4 inch

   *If choice C is selected set score to 1.*

36. Ball peen hammers are sized according to their
   - (A) peen head size
   - (B) face diameter
   - (C) overall length
   - (D) head weight

   *If choice D is selected set score to 1.*
37. Which recovery procedure should be used to minimize the loss of oil from the system during the recovery of refrigerant from small appliances such as a water cooler?

- (A) vapor-liquid recovery
- (B) initial recovery
- (C) liquid recovery
- (D) vapor recovery

*If choice D is selected set score to 1.*

38. If a condenser coil of an air-cooled container refrigeration system becomes dirty and requires cleaning, what would be an acceptable method of cleaning?

- (A) "Binks" gun with weak acid solvent
- (B) high-pressure water wash
- (C) copper wire rotary brush
- (D) all of the above

*If choice B is selected set score to 1.*

39. At ambient temperature and atmospheric pressure, what is the status of R-134a?

- (A) corrosive liquid
- (B) subcooled gas
- (C) odorless gas
- (D) superheated liquid

*If choice C is selected set score to 1.*

40. When purging a refrigeration gage manifold using system pressure as the source of refrigerant for purging, which of the fittings listed is normally tightened LAST?

- (A) the low-pressure hose fitting at the gage manifold low-pressure connection
- (B) the high-pressure hose fitting at the gage manifold high-pressure connection
- (C) the low-pressure hose fitting at the suction service valve service port
- (D) the high-pressure hose fitting at the discharge service valve service port

*If choice C is selected set score to 1.*

41. A refrigeration unit will tend to short cycle when operating under what conditions?

- (A) under heavy loads
- (B) during starting conditions
- (C) during hot gas defrost
- (D) lack of refrigerant

*If choice D is selected set score to 1.*
42. In an air conditioning system, what is the name of the chamber where the duct-work originates?

- (A) plenum chamber
- (B) intake chamber
- (C) vapor chamber
- (D) exhaust chamber

*If choice A is selected set score to 1.*

43. How does a refrigeration solenoid valve differ from a modulating valve?

- (A) Solenoid valves are only used in low voltage refrigeration control systems, while modulation valves are used in high voltage applications.
- (B) A liquid line solenoid valve is either completely opened or closed, whereas a modulation valve is infinitely positioned according to the strength of the applied electrical signal.
- (C) Both valves operate in exactly the same manner, only the manufacturer's terminology is the differentiating factor.
- (D) A solenoid valve can only be installed in liquid lines.

*If choice B is selected set score to 1.*

44. Which of the statements listed is applicable to the thermostatic expansion valve shown in the illustration? Illustration RA-0007

- (A) It regulates the amount of superheat at the solenoid valve.
- (B) The external equalizing pipe is connected to the liquid receiver.
- (C) The control bulb is located on the evaporator coil outlet.
- (D) It regulates the temperature of the refrigerated space.

*If choice C is selected set score to 1.*

45. Progressive flooding in the engine room may be minimized by securing watertight boundaries and __________.

- (A) pumping out flooded compartments
- (B) evacuating the engine room
- (C) dumping fuel oil
- (D) transferring reserve feedwater

*If choice A is selected set score to 1.*

46. As its temperature rises, the volume of fuel oil stored in a tank will __________.

- (A) remain the same
- (B) decrease
- (C) increase
- (D) none of the above

*If choice C is selected set score to 1.*
47. Which of the gases listed is the poisonous gas most likely to be found in a closed compartment involved in a fire?

- (A) Nitrogen
- (B) Carbon dioxide
- (C) Hydrogen
- (D) Carbon monoxide

*If choice D is selected set score to 1.*

48. When a refrigeration system is being topped off with a small amount of refrigerant through the low side with the compressor running, what should be done?

- (A) the refrigerant charging cylinder should be turned upside down
- (B) the suction service valve must be backseated
- (C) the discharge service valve must be frontseated
- (D) the refrigerant should be charged into the system as a vapor

*If choice D is selected set score to 1.*

49. If the valve labeled "D" in the illustration is a suction service valve, what will the port labeled "7" be connected to? Illustration RA-0008

- (A) to the line connected to the evaporator outlet
- (B) to the line connected to the evaporator inlet
- (C) to the inlet of the compressor
- (D) to the outlet of the compressor

*If choice A is selected set score to 1.*

50. What type of fuel oil as part of an oily-water mixture is most likely to have a density approaching that of water?

- (A) Distillate/residual fuel oil blends.
- (B) Heavy residual fuel oil.
- (C) Marine diesel oil.
- (D) Light distillate oil.

*If choice B is selected set score to 1.*

51. Water hammer in a steam heating system can be caused by __________.

- (A) filling the auxiliary boiler with cold water
- (B) steam admitted to a cold pipe
- (C) filling the auxiliary boiler with hot water
- (D) draining a sootblower line before cracking the steam supply valve

*If choice B is selected set score to 1.*
52. Which of the following statements is correct regarding the fog applicators used in conjunction with the combination nozzle?

- (A) On container ships, an applicator termed a bayonet or piercing type utilizes a sharp tip for cutting and penetrating the metal skin of a container.
  - (B) All cargo and miscellaneous vessels must be equipped with high velocity fog applicators for use with the required combination nozzle at each station.
  - (C) In machinery spaces, the applicators should be 10 to 12 feet in length to ensure all portions of the bilge can be effectively reached.
  - (D) All of the above.

*If choice A is selected set score to 1.*

53. Expansion tanks when used in a ship's hot water heating system may be of the open or closed type. In a closed type system, what would be the normal temperature range of the water?

- (A) 180°F to 212°F
  - (B) 220°F to 240°F
  - (C) 260°F to 280°F
  - (D) 320°F to 360°F

*If choice B is selected set score to 1.*

54. Allowances may be made for the expansion and contraction in piping by the use of expansion joints or _________.

- (A) retractable flanges
  - (B) union bulkhead fittings
  - (C) unions
  - (D) bends or loops in the line

*If choice D is selected set score to 1.*

55. Prior to initial light off of an idle boiler, what must first be done to prevent boiler flareback?

- (A) The furnace must first be purged of inert vapors and oxygen with the forced draft blower while the air register doors are open.
  - (B) The furnace must first be purged of inert vapors and oxygen with the forced draft blower while the air register doors are closed.
  - (C) The furnace must first be purged of combustible vapors with the forced draft blower while the air register doors are closed.
  - (D) The furnace must first be purged of combustible vapors with the forced draft blower while the air register doors are open.

*If choice D is selected set score to 1.*
56. You notice smoke coming from an open laundry room doorway, which smells like electrical insulation. After activating the fire alarm, which of the following would be the lowest action priority?

- (A) Break out the nearest fire hose.
- (B) Secure power to the washers and dryers.
- (C) Close the door to the room.
- (D) Locate the nearest CO₂ or dry chemical extinguisher.

*If choice A is selected set score to 1.*

57. Which of the hand valve configurations for the gauge manifold set is the correct set up for monitoring both the low and high system pressures? Illustration RA-0003

- (A) A
- (B) B
- (C) C
- (D) D

*If choice D is selected set score to 1.*

58. When repairing a refrigeration system, a swaging tool set would be used to carry out which of the following operations?

- (A) Swaging tools are used during the breaking-in of refrigeration compressors and drive motors.
- (B) Swaging tools can be used to expand an end of one tube to fit onto a tube of the same original outside diameter.
- (C) Swaging tools are used to remove any sweated edges formed on the tubing while soldering.
- (D) Swaging tools are no longer used with repairing refrigeration systems due to progressive changes in the tool industry.

*If choice B is selected set score to 1.*

59. Which of the listed methods, is the most effective to fight a fire on the open deck of a vessel if using a dry chemical type fire extinguisher?

- (A) Direct the extinguisher discharge at the base of the fire.
- (B) Move the discharge stream back and forth in a rapid sweeping motion.
- (C) Approach the fire from the windward side.
- (D) All of the above.

*If choice D is selected set score to 1.*
60. Inhalation of high concentrations of chlorofluorocarbon refrigerants (CFCs) may have which of the following effects?

- (A) drowsiness
- (B) cardiac arrhythmias
- (C) loss of concentration
- (D) all of the above

*If choice D is selected set score to 1.*

61. Which of the following shoring materials is a long bar or beam used to distribute the pressure of a shore?

- (A) Beam
- (B) Shole
- (C) Wedge
- (D) Strongback

*If choice D is selected set score to 1.*

62. What is the drive arrangement of refrigeration compressor shown in figure "B" of the illustration?

Illustration RA-0041

- (A) serviceable, bolted, accessible semi-hermetic
- (B) external-drive
- (C) welded, fully hermetic
- (D) open

*If choice C is selected set score to 1.*

63. The Muster List ("Station Bill") shows each crew lifeboat station, their duties during abandonment, basic instructions, and __________.

- (A) instructions for lowering the survival capsule
- (B) all emergency signals
- (C) work schedule
- (D) the time each weekly drill will be held

*If choice B is selected set score to 1.*
64. What is true concerning frost build-up on the evaporator coils of a multi-box direct expansion refrigeration system?

- (A) the frost will increase the refrigeration effect
- (B) the frost can be removed by passing hot gas through the coils or energizing defrost heaters with the evaporator fan still running
- (C) the frost can be removed by passing hot gas through the coils or energizing defrost heaters with the evaporator fan shut down
- (D) the frost can be quickly removed by simply shutting down the compressor

*If choice C is selected set score to 1.*

65. Which of the following statements is correct concerning the testing of an R-22 refrigeration system for leaks in an enclosed compartment with a halide torch?

- (A) The flame of a halide torch will turn blue in the presence of R-22.
- (B) Halide torches are useful in locating very small R-22 leaks.
- (C) To gain sensitivity, the largest possible flame should be used with the halide torch.
- (D) Halide torches are not suitable for detecting R-22 leaks.

*If choice B is selected set score to 1.*

66. Which of the following thermometers provides a remote display of temperature on a rotary dial scale and works on the principle of thermal expansion?

- (A) Bimetallic thermometer
- (B) Bourdon tube thermometer
- (C) Liquid-in-glass thermometer
- (D) Thermocouple pyrometer

*If choice B is selected set score to 1.*

67. The principle personnel hazard unique to Halon fire extinguishers is __________.

- (A) skin irritation
- (B) displacement of oxygen
- (C) inhaling toxic vapors produced when exposed directly to a flame for extended periods
- (D) eye irritation produced immediately after discharge from cylinder

*If choice C is selected set score to 1.*

68. The device shown in the illustration is a/an __________. Illustration GS-0116

- (A) oil scraper ring stuffing box for a crosshead engine
- (B) vane type steering gear
- (C) mechanical shaft seal
- (D) diesel engine motor mount

*If choice B is selected set score to 1.*
69. Refrigeration systems using forced air circulation evaporators have a tendency to cause rapid dehydration of produce in chill boxes. Which of the following will minimize this dehydration?

- (A) the air is circulated rapidly over a small evaporator with a minimum temperature differential
- (B) the air is circulated slowly over a large evaporator with a maximum temperature differential
- (C) the air is circulated rapidly over a small evaporator with a maximum temperature differential
- (D) the air is circulated slowly over a large evaporator with a minimum temperature differential

*If choice D is selected set score to 1.*

70. What is the whistle signal for stop lowering boats?

- (A) 1 short blast of the whistle.
- (B) 2 short blasts of the whistle.
- (C) 3 short blasts of the whistle.
- (D) Continuous blast of the whistle for not less than 3 seconds.

*If choice B is selected set score to 1.*