U.S.C.G. Merchant Marine Exam

Assistant Engineer – MODU

Q717 General Subjects

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

1. The amount of HCFC-123 in a storage cylinder is measured by what means?
   - (A) saturation pressure
   - (B) volume
   - (C) weight
   - (D) saturation temperature

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

2. The term "oil foaming" in refrigeration practice, is used to describe what event?
   - (A) release of dissolved lubricant from the refrigerant in the crankcase
   - (B) sudden evaporation of dissolved refrigerant from the lubricant in the crankcase
   - (C) sudden evaporation of entrapped air from the refrigerant liquid
   - (D) sudden evaporation of entrapped moisture from the crankcase lubricant

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

3. The carbon seal ring of a refrigeration compressor crankshaft mechanical seal is held in position against the stationary ring face by using what device?
   - (A) spring
   - (B) snap ring
   - (C) thrust washer
   - (D) woodruff key

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

4. Given that valve "14" is the king solenoid valve, which of the following statements is true? Illustration RA-0012
   - (A) Valves "28" and "36" are both freeze box solenoids.
   - (B) Valves "28" and "36" are both chill box solenoids.
   - (C) Valve "28" is the chill box solenoid, and valve "36" is the freeze box solenoid.
   - (D) Valve "36" is the chill box solenoid, and valve "28" is the freeze box solenoid.

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

5. In a refrigeration system, the bulb for the thermal expansion valve is always located where?
   - (A) at the beginning of the bottom row of the evaporator coils
   - (B) at the evaporator coil outlet
   - (C) in the middle of the evaporator coils
   - (D) at the evaporator coil inlet

   *If choice B is selected set score to 1.*
6. In a refrigeration system, the push-pull technique can be used for the recovery of the refrigerant in what state?

- (A) liquid only
- (B) vapor only
- (C) both liquid and vapor
- (D) should never be used with low-pressure systems

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

7. Before charging a refrigeration unit, unless quick disconnect fittings are used, the refrigerant charging hoses should be prepared in what way?

- (A) they should be cleaned with carbon tetrachloride
- (B) they should be flushed with clean refrigerant oil
- (C) they should be warmed in an oven
- (D) they should be purged with refrigerant

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

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

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

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

9. When starting a reciprocating refrigeration compressor that has been shut down for a period of time, you should manually throttle which valve?

- (A) suction valve
- (B) king valve
- (C) sea water valve
- (D) expansion valve

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

10. For safe storage, the maximum allowable temperature to which refrigerant bottles should be exposed is what temperature?

- (A) 100°F
- (B) 125°F
- (C) 150°F
- (D) 175°F

*If choice B is selected set score to 1.*
11. According to 46 CFR Subchapter J, what is true concerning the installation of batteries used for diesel engine starting?

- (A) be located as close as possible to the engine
- (B) be located in a locker on the weather deck
- (C) only be of the nickel alkaline type
- (D) have sufficient capacity to provide at least 50 starts consecutively without recharging

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

12. Which of the illustrated motors has an open, drip-proof (ODP) motor enclosure? Illustration EL-0001

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

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

13. Which of the following statements represents the main difference between an electromagnetic relay and an electromagnetic contactor as used in motor control and power circuits?

- (A) A relay is series connected and a contactor is parallel connected.
- (B) Contactors control current and relays control voltage.
- (C) Contactor contacts can handle heavier loads than relay contacts.
- (D) Contactor contacts are made from silver and relay contacts are made from copper.

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

14. How will the value of the output frequency change if the load is removed from a turbo-generator having a governor speed droop setting of 3%?

- (A) It will increase.
- (B) It will become variable.
- (C) It will remain unchanged.
- (D) It will decrease by approximately 3%.

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

15. In which of the following branch circuits types would time lag fuses (or dual-element fuses) be MOST likely used?

- (A) main lighting circuits
- (B) motor starting circuits
- (C) emergency lighting circuits
- (D) general alarm circuits

*If choice B is selected set score to 1.*
16. Which of the wave shapes shown in the illustration is termed a sinusoidal wave? Illustration EL-0088

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

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

17. What is the name of the semiconductor device with the essential characteristic that it decreases in resistance with an increase in temperature?

- (A) thermistor with a positive temperature coefficient
- (B) resistance temperature detector
- (C) thermistor with a negative temperature coefficient
- (D) thermocouple

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

18. To facilitate communication between the wheelhouse and the steering gear room in a steering emergency where no external source of power is required, what means of two-way communication would be provided?

- (A) Emergency loudspeaker system
- (B) Two-way portable radios
- (C) Sound-powered telephone system
- (D) Ship-service telephone system

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

19. What is the functional purpose of the zener diode "CR1" as shown in section "D" of the regulated DC power supply? Illustration EL-0085

- (A) is a temperature compensator
- (B) aids in output voltage regulation
- (C) prevents excessive currents
- (D) corrects power factor

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

20. Referring to illustrated diagram, what type of HVAC system is shown? Illustration RA-0009

- (A) A variable air volume system
- (B) A single zone system
- (C) A terminal reheat system
- (D) A dual duct system

*If choice B is selected set score to 1.*
21. Accidental flooding of the engine room bilges through the bilge system is prevented by __________.

- (A) stop-check valves installed in the bilge suction manifolds
  - (B) using a positive displacement reciprocating bilge pump
  - (C) installing eductors in all bilge rose boxes
  - (D) installing a swing check before each bilge valve

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

22. Aftercoolers are used with air compressors to __________.

- (A) dampen pressure pulses in the discharge air
- (B) decrease the density of compressed air
- (C) ensure complete expansion of the compressed air
- (D) reduce the temperature of compressed air

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

23. As shown in figure "A" of the illustrated block diagram of a central operating system configured for direct digital control, what does the output system block "DIGITAL OUTPUT" represent? Illustration EL-0095

- (A) It receives digital outputs from the CPU and conditions these to digital signals for transmission to the digital actuators.
  - (B) It receives analog outputs from the CPU and converts these to digital signals for transmission to the digital actuators.
  - (C) It receives digital outputs from the CPU and converts these to analog signals for transmission to the analog actuators.
  - (D) It receives analog outputs from the CPU and conditions these to analog signals for transmission to the analog actuators.

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

24. What type of temperature transmitter would be most suitable for measuring running gear bearing temperatures in a diesel engine in that it requires no contact with the bearing?

- (A) Radiation pyrometer
  - (B) Resistance temperature detector
  - (C) Thermistor probe
  - (D) Thermocouple pyrometer

*If choice A is selected set score to 1.*
25. Hot water heaters used in potable water systems may have multiple heat sources, such as an electric heating element and a jacket water heated tube bundle. What is the primary purpose of such an arrangement?

- (A) Allow electricity to be used in port and jacket water to be used while underway.
- (B) Allow both the heat sources to be used when the demand for hot water is high, whether in port or underway.
- (C) Allow jacket water to be used in port and electricity to be used while underway.
- (D) Allow the designated backup heat source to be used in the event of failure of the designated primary heat source, whether in port or underway.

If choice A is selected set score to 1.

26. With regard to the number of passes through the tubes of shell-and-tube heat exchangers, what statement is true?

- (A) In single-pass and two-pass heat exchangers, the inlet and outlet tube-side fluid connections are at opposite ends.
- (B) In two-pass and four-pass heat exchangers, the inlet and outlet tube-side fluid connections are at the same end.
- (C) In single-pass and two-pass heat exchangers, the inlet and outlet tube-side fluid connections are at the same end.
- (D) In two-pass and four-pass heat exchangers, the inlet and outlet tube-side fluid connections are at opposite ends.

If choice B is selected set score to 1.

27. With an increase in temperature, the volume of hydraulic fluid

- (A) remains constant if pressure decreases
- (B) remains the same
- (C) increases
- (D) contracts

If choice C is selected set score to 1.

28. For the various sizes of tubing and wall thickness used in a hydraulic system, the inside diameter can be determined if it is remembered that the inside diameter equals the outside diameter less

- (A) the wall thickness
- (B) 1.5 times the wall thickness
- (C) 2 times the wall thickness
- (D) 2.5 times the wall thickness

If choice C is selected set score to 1.
29. Both the direction of flow and fluid flow rate of a variable displacement radial piston pump are determined by the relative positions of the __________.

- (A) pump shaft and horizontal ports
- (B) floating ring and cylinder body
- (C) floating ring and pump shaft
- (D) pump shaft and central valve

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

30. The component used in a hydraulic system to store potential energy in the form of hydraulic fluid under pressure, is the __________.

- (A) pump
- (B) ram
- (C) accumulator
- (D) piping

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

31. With respect to lubricating oils, what statement is true concerning viscosity and viscosity index?

- (A) Viscosity is a measure of an oil's ability to resist oxidation and viscosity index is a measure of an oil's ability to resist change in viscosity as the temperature changes.
- (B) Viscosity is a measure of an oil's internal resistance to flow and viscosity index is a measure of an oil's ability to resist change in viscosity as the temperature changes.
- (C) Viscosity is a measure of an oil's resistance to emulsification and viscosity index is a measure of an oil's ability to resist change in viscosity as the temperature changes.
- (D) Viscosity is a measure of an oil's lubricity and viscosity index is a measure of an oil's ability to resist change in lubricity as the pressure changes.

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

32. What is an engine room bilge oily-water separator designed to do?

- (A) Remove small amounts of oil from small amounts of water.
- (B) Remove small amounts of water from small amounts of oil.
- (C) Remove small amounts of oil from large amounts of water.
- (D) Remove small amounts of water from large amounts of oil.

*If choice C is selected set score to 1.*
33. The components indicated as “7” and “8” as shown in the illustration, are known as the __________.
Illustration GS-0153

- (A) first stage oil separator and drip pan
- (B) outlet weir and outlet baffle
- (C) second stage oil separator and drip pan
- (D) inlet weir and inlet baffle

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

34. Air leakage between the shaft and stuffing box packing in a centrifugal pump is prevented by __________.

- (A) a liquid seal
- (B) the stuffing box gland
- (C) lantern rings between the packing rings
- (D) a compressed packing gland

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

35. If a centrifugal pump were continually operated with the discharge valve closed, the __________.

- (A) motor controller overload would open
- (B) pump would eventually overheat
- (C) relief valve would continuously cycle open
- (D) motor would overheat

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

36. The function of the section labeled “C” in the device illustrated is to provide a/an __________.
Illustration GS-0075

- (A) area for pump packing
- (B) passage for gas to be discharged
- (C) bearing surface for the rotor shaft
- (D) passage for sealing liquid to enter the pump

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

37. In accordance with 33 CFR Subchapter O (Pollution), which type of Marine Sanitation Device (MSD) is used solely for the storage of sewage and flush water at ambient air pressure and temperature?

- (A) Type I
- (B) Type II
- (C) Type III
- (D) Type IV

*If choice C is selected set score to 1.*
38. Which of the devices shown in the illustration is designed for both inside and outside measurements? Illustration GS-0073

- (A) A
- (B) B
• (C) C
- (D) D

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

39. The letters 'NC' in '1/4-20 NC' indicates the bolt is __________.

- (A) made of nickel-cadmium metal
- (B) not clad with any coating
• (C) threaded with national coarse threads
- (D) made of non-corrosive metal

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

40. In what electrical temperature transmitting system is the system voltage generated by the magnitude of temperature difference between hot and cold junctions?

• (A) Thermocouple
- (B) Thermistor
- (C) Resistance temperature detector
- (D) Bimetallic sensor

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

41. Which of the following speed control devices is used strictly as a safety device to prevent prime mover damage and acts by shutting down the prime mover?

- (A) Over speed governor
- (B) Under speed trip
- (C) Speed-limiting governor
• (D) Over speed trip

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

42. What provision is made for sea chests for removal of ice from within the sea chest of a machinery space sea water cooling system during operation in icy waters?

- (A) The ice may be removed by using the compressed air sea chest blow connection, if provided.
- (B) The ice may be removed by using the chemical de-icing antifreeze connection, if provided.
- (C) The ice may be removed by using the fire main flushing connection, if provided.
• (D) The ice may be removed by using the steaming out sea chest blow connection, if provided.

*If choice D is selected set score to 1.*
43. Which of the following devices would be forbidden to use as a primary means of electrical isolation?

- (A) fused disconnect switch
- (B) circuit breaker
- (C) start/stop push button station
- (D) non-fused disconnect switch

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

44. What is used to protect a direct sensing steam pressure gauge from damage from contact with steam?

- (A) The installation of a siphon tube (pig-tail) oriented vertically in the entrance to the gauge.
- (B) The installation of a siphon tube (pig-tail) oriented horizontally in the entrance to the gauge.
- (C) The installation of a damping needle valve in the entrance to the gauge.
- (D) The installation of thermal insulation on the gauge.

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

45. Referring to the illustrated motorship fresh water cooling system drawing, what statement is true concerning the jacket water heater? Illustration MO-0212

- (A) The jacket water heater is used only when the engine is idle to keep the engine warm.
- (B) The jacket water heater is used only when the engine is idle for the sole purpose of generating fresh water at the evaporator.
- (C) The jacket water heater is used under high engine load conditions to dissipate excess engine heat.
- (D) The jacket water heater is used under low engine load conditions to provide supplemental heat for the evaporator.

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

46. Which of the projections represents the left side view of the object "X" in the illustration? Illustration GS-0022

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

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

47. In the illustration, line "D" is a/an __________. Illustration GS-0006

- (A) hidden line
- (B) sectioning line
- (C) outline
- (D) phantom line

*If choice A is selected set score to 1.*
48. Referring to the illustrated pneumatically operated diaphragm actuated control valve, what statement is true? Illustration GS-0051

- (A) The control valve is direct-acting and normally closed (NC).
- (B) The control valve is indirect-acting and normally closed (NC).
- (C) The control valve is indirect-acting and normally open (NO).
- (D) The control valve is direct-acting and normally open (NO).

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

49. In the illustrated huddling-chamber safety valve, what statement is true concerning the opening and closing forces acting upon the disc? Illustration SG-0018

- (A) The spring force acting downward on the disc is a valve closing force, and the sensed pressure acting upward on the disc is a valve opening force.
- (B) The spring force acting upward on the disc is a valve opening force, and the sensed pressure acting downward on the disc is a valve closing force.
- (C) The spring force acting upward on the disc is a valve closing force, and the sensed pressure acting downward on the disc is a valve opening force.
- (D) The spring force acting downward on the disc is a valve opening force, and the sensed pressure acting upward on the disc is a valve closing force.

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

50. Probably the most useful troubleshooting tools used in a predictive maintenance management program for shipboard machinery are vibration meters, analyzers, and monitors. What is the term that represents the distance a mass travels in a given direction as a result of a part vibrating during its periodic or oscillatory motion?

- (A) Vibration displacement
- (B) Vibration frequency
- (C) Vibration velocity
- (D) Vibration acceleration

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

Direct Digital Control

Manipulated Variables

Actuators

Plant Process

Measured Variables

Sensors

Output System

Analog
D/A

Computer
(CPU)

Input System

Analog
A/D

Digital Output

Operator
Console

B

Signal Processing Flowpath

Pressure

Transducer

Signal Conditioner

Filter

Multiplexer
Analog

Temperature

Transducer

Signal Conditioner

Filter

Flow

Transducer

Signal Conditioner

Filter

Sample and
Hold

Buffer

Analog/Digital
Converter

Computer
Processor

Digital
De-Multiplexer

Digital/
Analog
Converter

Displays

To Final Analog
Control Elements

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GS-0022

A

B

C

D
Fresh Water Cooling Systems

SSDG Cooling System

Piston Cooling System

Make-up Water

Injectors Cooling System

Jacket Cooling System

Make-up Water

SSDG FW Cooling Exp. Tank

M/E JW Cooling Expansion Tank

Ship’s Service Diesel Generator

Piston FW Cooling Drain Tank

Jacket Water Cooler

Evaporator

Telescoping Pipes

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