U.S.C.G. Merchant Marine Exam

Chief Engineer-OSV

Q683 Engineering Safety-Environmental Protection

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

1. Your vessel has just been struck by another vessel. After meeting with the captain and chief mate, you have immediately ordered the vessel specific damage control procedures in the vessel's approved stability booklet to be enacted. Which of the following statements is true?

   o (A) The Safety Management System will provide an IMO standard response for all collision response procedures, including damage control.
   o (B) The universal station billet assigning crew member responsibilities will provide adequate reference information to determine the adequate damage control response.
   o (C) The Certificate of Documentation issued to the vessel will be the primary reference document in order to calculate free surface corrections.
   o (D) The vessel general arrangement plan would be a critical reference document for your response providing accurate data showing watertight compartments, closures, vents and downflooding angles.

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

2. Which of the methods shown in the illustration is the correct way to fit shoring? Illustration SF-0016

   • (A) A
   o (B) B
   o (C) C
   o (D) D

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

3. While maneuvering up the East River your vessel runs aground. As the chief engineer of the vessel how would you proceed?

   o (A) Switch the salt water cooling suction to the low sea suction.
   o (B) Call your port engineer.
   o (C) Wait until the vessel docks to sound the fuel oil tanks.
   o (D) Sound all fuel oil tanks and inspect the engine room bilges and void spaces.

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

4. An acceptable method of temporarily sealing a crack formed in the hull of a vessel is to __________.

   o (A) tack weld a doubler plate over the crack
   o (B) shore up the crack with welded braces
   o (C) drill holes at each end
   o (D) apply a patch of sheet packing backed by a strongback or shoring

*If choice D is selected set score to 1.*
5. Progressive flooding in the engine room may be minimized by securing watertight boundaries and__________.
   - (A) evacuating the engine room
   - (B) dumping fuel oil
   - (C) transferring reserve feedwater
   - (D) pumping out flooded compartments

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

6. The safe and efficient use of the facepiece of a self-contained breathing apparatus is directly influenced by__________.
   - (A) the stowing of the facepiece
   - (B) the donning of the facepiece
   - (C) the maintenance of the facepiece
   - (D) all of the above

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

7. Kapok life jackets require proper care and should NOT be__________.
   - (A) stowed near open flame or where smoking is permitted
   - (B) used as seats, pillows, or foot rests
   - (C) left on open decks
   - (D) all of the above

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

8. An immersion suit should be equipped with a/an__________.
   - (A) air bottle for breathing
   - (B) whistle and hand-held flare
   - (C) whistle, strobe light, and reflective tape
   - (D) whistle, hand-held flare, and sea dye marker

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

9. Which of the following statements is true concerning an immersion suit and its use?

   - (A) Only a light layer of clothing may be worn underneath.
   - (B) They provide sufficient flotation to do away with the necessity of wearing a life jacket.
   - (C) They should be tight fitting.
   - (D) A tear in the suit will not appreciably reduce its value.

   *If choice B is selected set score to 1.*
10. In order to retrieve an inflatable life raft and place it on deck, you should heave on the _________.
   - (A) lifelines
   - (B) righting strap
   - (C) sea anchor
   - (D) towing bridle

   If choice D is selected set score to 1.

11. Which of the following must be carried out in order to manually launch an inflatable life raft not designed for float-free operation?
   - (A) Attach the weak link to the vessel.
   - (B) Simply breaking the weak link.
   - (C) Cutting the container securing straps.
   - (D) Depress the hydrostatic release button.

   If choice D is selected set score to 1.

12. When a rescue vessel approaches a survival craft in heavy seas, the person in charge of the survival craft should _________.
   - (A) tie up to the rescue vessel
   - (B) transfer only those personnel who are not seasick
   - (C) wait for calmer weather before transferring personnel
   - (D) transfer all personnel immediately

   If choice C is selected set score to 1.

13. A self-righting survival craft will return to an upright position provided that all personnel _________.
   - (A) are seated with seatbelts on and doors shut
   - (B) are seated with seatbelts on and doors open
   - (C) are to shift to one side to right it
   - (D) escape from the craft

   If choice A is selected set score to 1.

14. A fire can be extinguished by removing _________.
   - (A) the heat
   - (B) the fuel
   - (C) the oxygen
   - (D) any of the above

   If choice D is selected set score to 1.
15. A tank has been sealed and unventilated for a long period of time. Which of the following statements is true?
   - (A) The tank is safe to enter.
   - (B) The tank is especially dangerous to enter.
   - (C) Carbon monoxide is present.
   - (D) Water vapor present when the tank was sealed has oxidized.

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

16. 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) Hydrogen
   - (C) Carbon dioxide
   - (D) Carbon monoxide

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

17. Through which of the listed processes is sufficient heat produced to cause spontaneous ignition?
   - (A) Aeration
   - (B) Anaerobic decomposition
   - (C) Putrefaction
   - (D) Oxidation

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

18. The spreading of fire as a result of heat being carried through a vessel's ventilation system, is an example of heat transfer by __________.
   - (A) conduction
   - (B) convection
   - (C) radiation
   - (D) windage

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

19. A Type A fire has been reported onboard your vessel. What type of materials would your fire teams expect to find at the scene?
   - (A) Electrical equipment where the use of a non-conducting extinguishing agent is of first importance
   - (B) Ordinary combustible materials where the quenching and cooling effects of quantities of water, or solutions containing large percentages of water, are of first importance
   - (C) Metals
   - (D) Flammable liquids, greases, etc., where a blanketing effect is essential

*If choice B is selected set score to 1.*
20. A fire, occurring in the windings, of an overloaded electrical motor, is considered a __________.
   o (A) class "A" fire
   o (B) class "B" fire
   • (C) class "C" fire
   o (D) class "D" fire
   
   If choice C is selected set score to 1.

21. Paints and solvents used aboard a vessel should be __________.
   o (A) stowed safely at the work site until work is completed
   o (B) covered with a fine mesh screen to protect from ignition sources
   o (C) drained into a common container after each use
   • (D) returned to the paint locker after each use
   
   If choice D is selected set score to 1.

22. The most likely location for a liquid cargo fire to occur on a tanker would be __________.
   o (A) in the amidships house
   o (B) at the main deck manifold
   o (C) at the vent header
   • (D) in the pumproom
   
   If choice D is selected set score to 1.

23. Good housekeeping on a vessel prevents fires by __________.
   o (A) allowing better access in an emergency
   • (B) eliminating potential fuel sources
   o (C) eliminating trip hazards
   o (D) improving personnel qualifications
   
   If choice B is selected set score to 1.

24. You are reviewing emergency procedures with new crew members. How would you direct them to proceed if they hear the fire and emergency signal on the ship's general alarm or whistle?
   o (A) Report to their stateroom and wait further instructions.
   o (B) Report to the bridge and wait further instructions.
   o (C) Report directly to the scene of the emergency to help.
   • (D) Report to their assigned duty station as posted on the Station Bill, so an accurate muster can be taken.
   
   If choice D is selected set score to 1.
25. How would you ensure that your crew is prepared to combat a shipboard fire using ship's equipment?

- (A) Conduct required drills, simulating fire conditions and training with ship's equipment.
- (B) Check training records, to see if crew members have attended a firefighting training course.
- (C) Have them read a firefighting text book.
- (D) Show crew generic fire training videos.

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

26. In a typical automatic fire alarm system, all zone circuits are always connected ________.

- (A) to the trouble alarm supervising resistor
- (B) in series
- (C) in parallel
- (D) to the detecting cabinet

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

27. When an oil fire has been extinguished, the surface of the oil should be kept covered with foam to prevent ________.

- (A) boiling of the heated oil
- (B) air from contacting the oil vapors permitting reignition
- (C) spontaneous combustion below the oil surface
- (D) toxic fumes from escaping to the surface

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

28. During onboard training with your engineers you review the various firefighting agents available for use onboard a ship. Which of the following statements describes carbon dioxide as an extinguishing agent?

- (A) Carbon dioxide is a finely divided mist produced by either a high or low velocity fog nozzle. It is used for knocking down flames and cooling hot surfaces.
- (B) Carbon dioxide is a sodium or potassium bicarbonate or monosodium phosphate solution, usually applied from a semi-fixed or portable extinguisher.
- (C) Carbon dioxide is produced by a special foam nozzle or by a fixed system. It is used to form a blanket over the surface of burning liquids. It is effective only with liquids which are not appreciably soluble in water.
- (D) Carbon dioxide may be applied through a fixed or semi-fixed system, or from a portable extinguisher. It is useful for inerting a compartment or for putting out small local fires.

*If choice D is selected set score to 1.*
29. 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) Approach the fire from the windward side.
   - (B) Direct the extinguisher discharge at the base of the fire.
   - (C) Move the discharge stream back and forth in a rapid sweeping motion.
   - (D) All of the above.

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

30. Which portable fire extinguisher is normally recharged in a shore facility?
   - (A) Water (cartridge-operated)
   - (B) Water (pump tank)
   - (C) Dry chemical (cartridge-operated)
   - (D) Carbon dioxide

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

31. The fire extinguishing equipment shown in the illustration is a large __________. Illustration SF-0009
   - (A) Halon 1301 hose reel system
   - (B) dry chemical hose reel system
   - (C) CO₂ hose reel system
   - (D) light water hose reel system

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

32. A low velocity fog applicator is held in an all-purpose nozzle by a bayonet joint. The applicator is prevented from rotating in the joint by __________.
   - (A) a spring-loaded catch
   - (B) water pressure
   - (C) a locknut
   - (D) a keeper screw

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

33. Properly stowed fire hose is either faked or rolled into a rack with the __________.
   - (A) nozzle end arranged to be easily run out to the fire
   - (B) female end available to be quickly connected to the hydrant
   - (C) male end attached to the adjacent fire hydrant
   - (D) male and female ends connected together to prevent damage

   *If choice A is selected set score to 1.*
34. Why is it essential to introduce CO₂ from a fixed fire extinguishing system, into a large engine room, as quickly as possible?

- (A) The fire may warp the CO₂ piping.
- (B) Updraft from the fire tends to carry the CO₂ away.
- (C) To keep the fire from spreading through the bulkheads.
- (D) Carbon dioxide takes a long time to disperse to all portions of a space.

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

35. What would be a major consequence of allowing the refrigeration system of a low-pressure fixed CO₂ fire extinguishing system to remain inoperable?

- (A) Liquid CO₂ would overflow from the tank through the drain line as the temperature is increased.
- (B) The entire charge may eventually be lost due to CO₂ boil-off venting through the relief valve.
- (C) Excessive condensation inside the tank would freeze causing a restriction in the discharge piping.
- (D) The warmed charge of CO₂ would not be effective in extinguishing a fire.

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

36. Your ship has a low-pressure carbon dioxide system that covers the engine room. Fire has been reported in the engine room and the decision has been made to dump the carbon dioxide system into the engine room. While following the procedures to release carbon dioxide you find one engine room supply fan damper that will not close. How should you proceed?

- (A) Continue the release procedures and dump the carbon dioxide, after the release then try to seal the fan damper opening.
- (B) Cover the fan damper opening with a plastic tarp to stop the flow of air into the engine room and then continue with the release procedures.
- (C) Continue the release procedures and dump the carbon dioxide with the damper still open.
- (D) Cover the fan damper opening with burlap bags to slow the flow of air into the engine room and then continue with the release procedures.

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

37. An oil fire is reported in the purifier room bilge. How would you combat this fire?

- (A) Direct a dry powder extinguisher at the base of the fire and discharge the powder in a sweeping motion to extinguish the fire.
- (B) Direct aqueous film forming foam off the overhead or nearby bulkhead, using a bank down or bounce off method to extinguish the fire.
- (C) With water using a low velocity fog applicator to extinguish the fire.
- (D) Direct aqueous film forming foam in a straight stream into the fuel to extinguish the fire.

*If choice B is selected set score to 1.*
38. The most important characteristic of a fire extinguishing agent to be used on electrical fires is for the agent to be __________.

- (A) non-conducting
- (B) flame resistant
- (C) easily removable
- (D) wet

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

39. As an engineer on a tanker of more than 1600 gross tons on an international voyage, how would you direct the fire team to combat a large cargo space fire?

- (A) Open the ullage caps and lower the level in tanks adjacent to the tank on fire.
- (B) Use the inert gas system to extinguish the fire.
- (C) Use fixed water and foam systems to extinguish the fire.
- (D) Use the fixed carbon dioxide system to extinguish the fire.

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

40. One of the main concerns when fighting a galley fire is __________.

- (A) the loss of stability
- (B) the igniting of a grease fire in the range hood ventilation system
- (C) contaminating food with extinguishing agent
- (D) spreading of fire through the engineering space

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

41. As first engineer you are the senior engineering officer in Emergency Squad #1. The fire alarm sounds and you report to the muster station where the bridge informs you smoke has been reported coming from the ship's laundry room. What should your first action be?

- (A) Help dress out other crew members in fireman's outfit.
- (B) Secure power and ventilation to the laundry room and inform the bridge once this is done.
- (C) Charge the ship's fire main.
- (D) Start boundary cooling the area.

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

42. The volatility of a liquid is the tendency of a liquid to __________.

- (A) vaporize
- (B) asphyxiate
- (C) ignite
- (D) explode

*If choice A is selected set score to 1.*
43. By definition, an example of a flammable liquid is __________.
   o (A) kerosene
   • (B) gasoline
   o (C) animal and vegetable oils
   o (D) caustic potash

   If choice B is selected set score to 1.

44. Which of the following is classified as a grade "E" combustible liquid?
   o (A) Most commercial gasoline
   • (B) Bunker "C"
   o (C) Very light naphtha
   o (D) Benzene

   If choice B is selected set score to 1.

45. When preparing to pump flammable liquids with a centrifugal pump, you should __________.
   • (A) check for gland leakage and any fire hazard
   o (B) draw a small quantity of liquid to prime the pump
   o (C) have a standby pump running with the discharge valve closed
   o (D) lift the relief valve by hand to check its operation

   If choice A is selected set score to 1.

46. Petroleum vapors are dangerous __________.
   • (A) at all times due to their toxicity
   o (B) only if the oxygen concentration is below 16 percent
   o (C) only if the source of the vapor is above its flash point
   o (D) only if the vapor is between the upper and lower explosive limit

   If choice A is selected set score to 1.

47. Span gas is used aboard liquefied natural gas carriers to __________.
   o (A) detect leaks in cargo piping
   o (B) odorize the cargo
   • (C) calibrate the gas leak detectors
   o (D) inert the barrier spaces

   If choice C is selected set score to 1.
48. The atmosphere of an empty fuel tank is tested and designated "gas free". Which of the following statements is correct concerning this tank?

- (A) The gas free status is good as long as the initial conditions remain unchanged.
- (B) The tank should be frequently retested.
- (C) The concentration of flammable gas in the compartment is less than 10% of the lower flammable limit.
- (D) All of the above.

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

49. A liquid, as listed on a Safety Data Sheet (SDS), having a flash point below 100°F (37.78°C) is called a/an __________.

- (A) combustible liquid
- (B) viscous liquid
- (C) explosive liquid
- (D) flammable liquid

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

50. Which of the following machinery space operations is required to be logged in the Oil Record Book?

- (A) Shifting suction of main fuel pump to reserve fuel oil tank.
- (B) Daily inspection of engine room bilges.
- (C) Changing out sprayer plates to adjust for steam demand.
- (D) Ballasting or cleaning of fuel oil tanks.

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

51. When making entries in the Oil Record Book, all quantities should be __________.

- (A) recorded as cubic meters with a conversion to barrels
- (B) verified by the chief engineer
- (C) consistently recorded through the Oil Record Book in one specified unit (gallons, barrels, cubic meters)
- (D) recorded directly from the oil discharge monitor

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

52. After fuel tanks have been filled and bunkers completed, which of the listed procedures should be followed next?

- (A) The tanks should be marked with a bull stamp on the manifold filling valve.
- (B) The tanks should be made seaworthy to prevent contamination.
- (C) The tanks should be sounded to verify levels.
- (D) The pressure-vacuum relief valve should be reset.

*If choice C is selected set score to 1.*
53. If the overflow tank high-level alarm sounds while the fuel oil tanks are being topped off, the engineer should __________.
   - (A) reduce the fuel oil pumping rate
   - (B) close the overflow tank filling valve
   - (C) stop the fuel oil pumping operation
   - (D) close the static leg filling valve

   *If choice C is selected set score to 1.

54. Coast Guard regulations require a shipboard oil pollution emergency plan to be reviewed __________.
   - (A) once a year
   - (B) once every two years
   - (C) once every four years
   - (D) once every five years

   *If choice A is selected set score to 1.

55. Which of the following statements is true concerning the overboard discharge of vessel sewage at sea?
   - (A) The vessel must have an approved sewage plant.
   - (B) The vessel may discharge disinfected and comminuted sewage into the sea, from an approved system, only if the vessel is more than 3 nautical miles from the nearest land.
   - (C) The vessel may discharge sewage into the sea, from an approved system which is not comminuted or disinfected, only if the vessel is more than 12 nautical miles from the nearest land.
   - (D) All of the above.

   *If choice D is selected set score to 1.

56. Your ship has left shore on the east coast of the United States, how far must you be from shore to be able to discharge paper waste into the Atlantic Ocean?
   - (A) 3 nautical miles
   - (B) You may not discharge paper waste into the Atlantic Ocean.
   - (C) 12 nautical miles
   - (D) 25 nautical miles

   *If choice B is selected set score to 1.
57. You are the chief engineer of a vessel of more than 1600 gross tons on an international voyage. While bunkering lube oil in port, the hose fails and oil is spilled into the harbor. After securing the transfer, how would you proceed?

- (A) Fill out a Declaration of Inspection for the transfer operation.
- (B) Set out a boom around the ship to control the spread of the oil.
- (C) Call the local news outlets and report the oil spill.
- (D) Perform post incident drug and alcohol testing on engine crew members not involved in the transfer operation.

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

58. You are providing onboard training to your engineers on the factors affecting trim and stability. What instructions do you give your engineers to stabilize the ship should it experience an unstable rolling behavior?

- (A) Add ballast to wing tank to the side of the ship with an angle of list.
- (B) Discharge water from the forepeak tank.
- (C) Add ballast to a centerline double bottom tank.
- (D) Discharge dirty ballast from a centerline double bottom tank.

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

59. Your vessel was damaged in a collision and one compartment has partially flooded. The vessel has free communication with the sea with water flowing in and out as the vessel rolls. Which of the following is the most important factor contributing to free communication loss of stability?

- (A) Distance from the vessel centerline to the centerline of the damaged compartment.
- (B) Depth from the bottom of the damaged compartment to the waterline.
- (C) Whether or not the damaged compartment on the opposite side of the vessel is full or empty.
- (D) Breadth of the damaged compartment affected.

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

60. What standard mathematical formula is commonly used to calculate a vessel's waterplane area for stability purposes?

- (A) Pythagorean Rule
- (B) Reynolds Number Rule
- (C) Simpson's Rule
- (D) Standard Logarithmic Rule

*If choice C is selected set score to 1.*
61. If the cause of a sudden severe list is due to negative initial stability, counter-flooding into empty ballast tanks may___________.

- (A) bring the unit to an upright equilibrium position
- (B) cause an increase in the righting arm
- (C) cause the unit to flop to a greater angle
- (D) increase the righting moment

If choice C is selected set score to 1.

62. With no environmental forces acting on the vessel, the center of gravity of an inclined vessel is vertically aligned with the___________.

- (A) original vertical centerline
- (B) longitudinal centerline
- (C) metacenter
- (D) center of flotation

If choice A is selected set score to 1.

63. The water in which a vessel floats provides vertical upward support. The point through which this support is assumed to act is known as the center of___________.

- (A) flotation
- (B) buoyancy
- (C) effort
- (D) gravity

If choice B is selected set score to 1.

64. If flammable vapors have penetrated a gas free space, which of the following actions would be the most hazardous to perform?

- (A) Opening switches in the space to de-energize circuits.
- (B) Closing switches adjacent to the space to operate vent fans.
- (C) Leaving electrical circuits energized in the space.
- (D) Securing all power to the space from a remote location.

If choice A is selected set score to 1.

65. The potable water tanks on your vessel were drained for inspection and cleaning. What would you do before refilling with water?

- (A) Disinfect the tank with an ammonia solution.
- (B) Use hull paint to touch up bulkheads in the water tanks.
- (C) Nothing needs to be done before refilling the tanks.
- (D) Disinfect the tank with a chlorine solution.

If choice D is selected set score to 1.
66. An oxygen indicator will detect __________.

- (A) the presence of harmful amounts of carbon monoxide
- (B) an oxygen deficiency in a space
- (C) concentrations of explosive gas
- (D) all of the above

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

67. When taking samples of a tank atmosphere with an explosimeter, you should __________.

- (A) only sample around the deck longitudinals as gases are lighter than air
- (B) sample only near the ullage openings as all vapors accumulate there
- (C) sample as much of the tank as possible, especially at the bottom
- (D) avoid sampling in the vicinity of deep webs to prevent false readings

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

68. Yawing is the angular motion of the vessel about what axis?

- (A) Centerline
- (B) Vertical
- (C) Transverse
- (D) Longitudinal

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

69. Coast Guard Regulations (46 CFR) require how many 15 pound carbon dioxide fire extinguishers to be installed in the boiler room of an 8,000 horsepower steam propelled vessel?

- (A) Two
- (B) Four
- (C) Six
- (D) Eight

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

70. According to 46 CFR, Part 30, a Grade "E" petroleum product is __________.

- (A) light fuel oil
- (B) a combustible liquid
- (C) kerosene
- (D) a flammable liquid

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