

ASSIGNMENT 2

Textbook Assignment: Buoyancy and Stability, Engineering Plant, Ventilation System, and Refrigeration and Air-Conditioning Systems, Chapters 5-8

1. Buoyancy as it relates to submarines is determined by
 1. volume alone.
 2. density of the object.
 3. density and volume.
 4. temperature of the liquid surrounding the object.
2. The upward force exerted on an object equals
 1. the weight of the object resisted by the force.
 2. ratio of density versus volume of the object.
 3. the weight of fluid it displaces.
 4. the percentage of the object submerged.
3. Ten inch diameter balls of aluminum (48 lbs.) and cast iron (136 lbs.) are weighed in air and then submerged in water and weighed again. The decrease in weight due to buoyancy is
 1. 35% (48/136).
 2. exactly the same or 18.9 lbs.
 3. 0, both are non-buoyant and sink to the bottom.
 4. 29.1 lbs. for aluminum and 117.1 for cast iron.
4. When water is admitted into the main ballast tanks of a submarine it is able to submerge because:
 1. the submarine is now heavier and can sink below the surface.
 2. the momentum of the water rushing into the tanks forces the submarine down.
 3. the ballast tanks shrink in size due to outside pressure as the submarine goes deeper into the ocean.
 4. the volume of displaced water has been reduced but the overall weight of the submarine has not changed
5. Buoyancy is the upward force exerted on a floating or immersed body and is _____ the weight of the body.
 1. dependent on
 2. independent of
 3. equal to
 4. opposite of
6. (TRUE/FALSE) Submarines can obtain a state of exact neutral buoyancy with careful control of ballast.
 1. True
 2. False
7. _____ is that property of a body that causes it to return to its original condition when disturbed.
 1. Neutral equilibrium
 2. Unstable equilibrium
 3. Positive equilibrium
 4. Stable equilibrium
8. Neutral equilibrium can be demonstrated by
 1. a cone balanced on its point.
 2. a cone resting on its side.
 3. a cone sitting on its base.
 4. a cone floating in water.
9. The center of gravity will be directly above the center of buoyancy when a vessel has zero list. If a vessel is tipped to port or starboard, the center of buoyancy will
 1. move to the side opposite of the direction of tilt.
 2. move closer to the center of gravity.
 3. move to the metacenter above the center of gravity.
 4. move to the center of gravity of the displaced water.

10. (TRUE/FALSE) As a submarine submerges the center of gravity moves as the center of buoyancy moves.
 1. True
 2. False.
11. The term “tumble home” means
 1. inward slope of the freeboard.
 2. outward slope of the freeboard.
 3. concave shape below waterline.
 4. convex shape below waterline.
12. (TRUE/FALSE) The cylindrical shape of a submarine’s hull provides one of the most stable configurations for surface travel.
 1. True
 2. False
13. For a submerged submarine the transverse and longitudinal centers of buoyancy and metacenters are
 1. proportional to the transverse and longitudinal distances
 2. dependant on the moment arms created by the angle on the ship..
 3. coincident.
 4. divergent.
14. To avoid the free surface effect in tanks aboard submarines
 1. tanks are always kept full.
 2. tanks are paired on opposite sides of the center of gravity and emptied or filled simultaneously.
 3. tanks are partitioned to minimize freeboard.
 4. tanks are kept thin a narrow and have no freeboard effect
15. On board the Fleet Type Submarine, each propeller was driven by
 1. a single diesel engine with direct drive
 2. dual diesel engines connected through a reduction gear
 3. a single diesel engine connected to a generator that powered an electric motor.
 4. dual diesel engines connected to dual generators powering dual electric motors and a reduction gear.
16. Each diesel engine runs at 750 RPM connected to a DC generator running at 750 RMP. The DC motors can run at 1,300 RMP because
 1. there is an electrical connection, no gear reduction necessary.
 2. a step-up pulley system is used to increase RPMs from 750 to 1300.
 3. two generators are used at 750 plus 750 equates to 1300 RPM due to mechanical inefficiency.
 4. they are connected with small-to-large clutch plate system producing 1300 RPM.
17. (TRUE/FALSE) Submarine diesel engines have cylinders liners that can be replaced when worn.
 1. True
 2. False..
18. (TRUE/FALSE) Pistons are made of bronze with alloy cast iron bushings in the piston hubs.
 1. True
 2. False
19. The purpose of the diesel engine scavenging blower is to
 1. provide additional oxygen by scavenging it from bubbles in sea water.
 2. remove excess air from the sump tank.
 3. recycle air from the crank shaft compartment.
 4. remove burnt gases from the cylinders.
20. A governor is used to control engine speed (RPMs). On a submarine diesel engine this is accomplished by
 1. a breaking mechanism on the main drive shaft.
 2. controlling intake air temperature.
 3. controlling intake air volume.
 4. regulating fuel injectors.
21. The diesel engine lubrication system also provides lubricating oil to
 1. main generators
 2. auxiliary diesel engine
 3. main reduction gears
 4. after stern bearing box

22. The maximum speed of the main generators are dependant upon
1. maximum electrical load of the submarine.
 2. number of battery cells to be recharged
 3. main motor RPMs.
 4. type of diesel engine connected, G. M. or Fairbanks Morse.
23. Hot air from electrical machinery is cooled by
1. circulating it through ducts in contact with the outer hull to be cooled by seawater.
 2. Freon tubes next to the air ducts.
 3. forcing it through water-cooled cores.
 4. passing it under a oil screen bath
24. (TRUE/FALSE) The auxiliary generator only differs from the main generators in size, weight and the number of some components.
1. True
 2. False
25. Dead slow speed of the submarine is accomplished by using
1. only one motor on one shaft.
 2. all four motors in series.
 3. switching the reduction gears gear ratio.
 4. turning on and off the motors so they only run 10% of the time.
26. The leakage of oil from the main propulsion shafts into the windings of the motors is prevented by
1. wax rings at the bearings.
 2. air blowers forcing the oil back to the shafts.
 3. pressurized rubber seals.
 4. oil-catching grooves and return drains..
27. When can cooling air and circulating water be turned off to the main motors?
1. When temperatures fall below 87.5° F.
 2. Under-ice operations.
 3. operation in SLOW position
 4. When the submarine is rigged for Ultra-quiete..
28. When submerged the main motors are powered by
1. only one diesel engine to conserve air.
 2. batteries.
 3. main generators.
 4. combination of main generators and batteries.
29. (TRUE/FALSE) The split type main propulsion control equipment was used on older Fleet Type Submarines that had reduction gears.
1. True
 2. False
30. One of the functions of the propulsion control equipment is uniform speed control of the main motors that control propeller speeds. Under normal travel the propellers should be at the same speed because
1. dissimilar speeds cause noise and possible detection
 2. the electrical imbalance could cause a motor to burn out.
 3. a diesel engine could backfire and shatter a cylinder lining.
 4. more thrust from one propeller will cause the submarine to turn in the opposite direction requiring course correction with the rudder.
31. When docked shore power is used to power equipment aboard the submarine. One other operation that can be performed with shore power is
1. charge the main battery.
 2. provide extra lights for a thorough cleaning of the submarine.
 3. electrify the hull to remove barnacles .
 4. energize the windlass to pull the submarine into dry dock.
32. (TRUE/FALSE) The main motors can be operated in series for slow-speed operation by cross connecting the positive side of one motor bus to the positive side of the opposite motor bus.
1. True
 2. False

33. To answer an “all back 2/3’s bell” and cause the main motors to operate in reverse you would
1. manually shift the reduction gears to reverse.
 2. move the two reverse levers to the ASTERN position reversing the current flow through the armatures.
 3. switch the motor generators from AC to DC current.
 4. stop the diesel engines and switch them from clockwise to counter-clockwise rotation.
34. (TRUE/FALSE) In order to maintain propulsions after the dive, you would need to move the battery selector lever to AFT BAT, FWD BAT or BOTH BAT.
1. True
 2. False
35. The auxiliary motors are supplied power through the forward and after distribution panels. In the case of an emergency, the two panels can be connected through a _____ circuit.
1. hard wire
 2. emergency spring
 3. overload
 4. bus-tie
36. (TRUE/FALSE) Auxiliary motors are sealed to prevent water from entering the windings during flooding.
1. True
 2. False
37. IC stands for Internal Communications. The IC motor-generators produce
1. 60 cycle a.c. current
 2. 60 cycle d.c. current
 3. d.c. current from the battery
 4. 175-345 volt d.c. power.
38. The battery manual disconnect switches are used
1. to disconnect the battery when not in use.
 2. switch battery use from the forward to after batteries.
 3. disconnect the batteries when they are being charged.
 4. only in an emergency to isolate the battery.
39. Dangerous gases are removed from the battery cells by a series of ducts. There are a total of _____ fans to exhaust the gases overboard.
1. 2
 2. 4
 3. 6
 4. 8
40. What allows two battery ventilation fans to be operated singly or together?
1. two pole switches
 2. variable speed control
 3. damper
 4. cross connect valve
41. (TRUE/FALSE) A major time consuming task during each patrol is to adjust the air flow through each cell of the battery by means of the regulators.
1. True
 2. False
42. The starboard emergency lighting system is powered by the _____ and the port emergency lighting system is powered by the _____ ,
1. forward battery, after battery
 2. starboard fore/aft battery, port fore/aft battery
 3. starboard generator, port generator
 4. No. 1 diesel generator, No. 2 diesel generator.
43. The sound-powered telephone system uses
1. 120 v, 60 Hz current
 2. 12 v, d.c. current
 3. 9v, d.c. lantern batteries
 4. self-generated current
44. The designator for the general announcing system is
1. 1MC.
 2. 1GA.
 3. Ga-1.
 4. XJA.

45. (TRUE/FALSE) The general announcing system (alarms, signals and voice communication) require direct current (d.c.) for operation.
1. True
 2. False
46. The IC switchboard is powered by
1. 12-volt direct current from the main battery.
 2. 115-volt a.c. generators.
 3. 250-volt d.c. motors and 120-volt a.c. generators.
 4. 400 Hz. a.c. generators.
47. The circuit designator for the torpedo firing system is
1. 6PA.
 2. 2MB.
 3. TF1.
 4. GT.
48. (TRUE/FALSE) Ship's supply air requires an 8-inch diameter pipe and 2000 cubic feet per minute ship's supply blower.
1. True
 2. False
49. Using Figure 7-1, what part of the outboard valve, when shut, would prevent sea water from entering the valve?
1. yoke
 2. support plate
 3. umbrella hood
 4. valve disk
50. When cruising on the surface, discharge from the exhaust blowers is
1. consumed by the engines.
 2. vented through the bridge trunk
 3. vented through the induction valves
 4. use to blow down the ballast tanks in an emergency.
51. Under routine operations, to determine if the induction valves are open or shut, you would
1. check the manual indicators in the freeboard.
 2. check the indicator lights in the control or engine rooms.
 3. test air pressure in supply mains.
 4. re-shut/open the valve to assure it is in the proper position.
52. The M.S.A type hydrogen detector indicator lights turn from white to red at
1. 1.25% hydrogen content.
 2. 3% “ “
 3. 4.5% “ “
 4. 6% “ “
53. (ref section 7B1) If there are 20,000 cubic feet of air space and 87 sailors aboard, in how many hours after a dive will the limiting values of O and CO2 be reached?
1. 8.57
 2. 9.19
 3. 11.37
 4. 13.28
54. CO2 absorbent containers should be removed from a compartment before what type of testing?
1. hydraulic leak checks
 2. MSW valve position testing
 3. electrical ground fault checks
 4. air testing compartments
55. (TRUE/FALSE) The inhalation of CO2 absorbent powder causes coughing and sneezing and is usually fatal.
1. True
 2. False
56. Used CO2 absorbent powder should be replaced when
1. the color has fully changed from white to green.
 2. the powder turns into small crystals.
 3. there is no longer a sulfur smell.
 4. the powder is no longer warm to the touch.
57. (TRUE/FALSE) The oxygen containers are connected between compartment in case the flasks in one compartment are depleted, others can be used.
1. True
 2. False
58. The engine induction and ship's supply valve is
1. 36-inch disk type, hydraulically operated.
 2. 24-inch ball type, manually operated.
 3. 18-inch disk type, hydraulically

- operated.
4. 12-inch gate type, pneumatically operated.
3. vaporizes.
 4. turns into a liquid..
59. Air from the Maneuvering Room Induction valve is used to cool
1. the motor generators.
 2. the operating control stand.
 3. electrical bus boards 5A and 5B.
 4. diesel exhaust manifolds.
60. A Bulkhead Flapper Valve is held open by
1. a removable padlock.
 2. ½” pins on both sides.
 3. hydraulic actuators.
 4. spring catches.
61. During the different ventilation operation conditions damper F has ____ possible positions while damper G has ____.
1. 1, 2
 2. 2, 3
 3. 3,2
 4. 2,1
62. (TRUE/FALSE) Air conditioning can only be running while recirculating and submerged.
1. True
 2. False
63. Supply air can come from Ship’s Supply Valve, Engine Induction, Aux. Engine Induction or
1. external hatches.
 2. torpedo hull valves.
 3. anchor chain locker when open.
 4. supply blower suction damper.
64. In the Fleet Type Submarine what type of refrigerant was used?
1. Helium-23
 2. Chlorine-14
 3. Freon-114
 4. Freon-12
65. When refrigerant picks up heat it
1. circulates through tubing..
 2. passes through the sea water condenser.
66. The refrigeration system is made up of the evaporator, compressor, receiver, thermostatic expansion valve and
1. DC power supply
 2. AC power supply
 3. receptor.
 4. condenser.
67. Boiling of the Freon is caused by
1. latent heat.
 2. being pumped through the condenser.
 3. passing through the receiver.
 4. depressurization.
68. (TRUE/FALSE) Compressing Freon from a low pressure vapor to a high pressure vapor increases its temperature.
1. True
 2. False
69. The point in the refrigeration cycle at which the Freon is at low pressure and low temperature is as it
1. enters the compressor.
 2. enters the evaporator.
 3. exits the condenser.
 4. exits the receiver.
70. The dividing line between the high-pressure and low-pressure side of the Freon cycle is
1. inlet to the compressor.
 2. outlet of the receiver.
 3. the dehydrator.
 4. the thermostatic expansion valve.
71. The air conditioning plant is a dual system that has two of each component except _____ that has four elements.
1. compressors
 2. condensers
 3. receivers
 4. evaporators
72. The capacity of the air-conditioning system is:

1. 5400 cu. ft. per hour
 2. 2400 cu. ft. per hour
 3. 8.0 tons
 4. 5400 pounds
73. If the compressor for the refrigeration system goes out and requires extended repair
1. all perishable food stores must be off loaded to a pier-side refrigeration facility.
 2. fire hoses can be wrapped around the refrigerator and sea water circulated through them to keep things cool
 3. cross connect the air-conditioning system compressor with the refrigeration system
 4. portable air-conditioners from the tender can be brought aboard to blow cool air on the refrigerators.
74. (TRUE/FALSE) The ratio in capacity of an air-conditioning ton and refrigeration ton is 2:1
1. True
 2. False
75. In an emergency when cross connecting the air-conditioning and refrigeration system the low pressure cutout valve must be reset to
1. 2 psi.
 2. 4 psi.
 3. 6 psi.
 4. 8 psi.