

Advanced Maritime Technology Concepts

Maritime Technology · Answer Key · 18 Questions

1. Which naval architecture principle quantifies the resistance a hull experiences when moving through water, often expressed as the product of fluid density, velocity squared, and wetted surface area?

- A) Froude Number
- B) Reynolds Number**
- C) Mach Number
- D) Prandtl Number

2. In ship propulsion, what is the primary function of a Kort nozzle, typically fitted around a propeller?

- A) To increase the propulsive efficiency in open water
- B) To reduce shaft power consumption
- C) To enhance thrust at low speeds and astern operation**
- D) To dampen propeller-induced vibrations

3. What is the fundamental purpose of a ballast water management system on modern merchant vessels?

- A) To improve fuel efficiency during voyages
- B) To prevent the introduction of invasive aquatic species**
- C) To increase ship stability in rough seas
- D) To facilitate cargo loading and unloading operations

4. Which of the following hull forms is primarily designed to minimize wave-making resistance at high speeds, often seen on fast ferries and patrol boats?

- A) Displacement hull
- B) Semi-planing hull
- C) Planing hull**
- D) Catamaran hull

5. The effectiveness of a rudder is significantly influenced by the flow of water over its surface. What phenomenon, characterized by a loss of lift and increased drag, can occur when the angle of attack of the water flow exceeds a critical limit?

- A) Cavitation
- B) Vortex shedding
- C) Stall**
- D) Hydrodynamic impact

6. In marine surveying and charting, what is the purpose of a multibeam echo sounder?

- A) To detect underwater obstacles with high accuracy
- B) To measure the depth of water across a wide swath**
- C) To identify fish populations for navigation
- D) To determine the density of seawater

7. What is the primary role of a Dynamic Positioning (DP) system on offshore vessels?

- A) To automatically steer the vessel along a pre-defined route
- B) To maintain the vessel's position and heading automatically using thrusters and propellers**
- C) To optimize fuel consumption during long voyages
- D) To monitor and control the vessel's cargo operations

8. Which classification society standard dictates the minimum structural requirements and design principles for ships, ensuring seaworthiness and safety?

- A) International Maritime Organization (IMO)
- B) International Labour Organization (ILO)
- C) Classification Societies (e.g., Lloyd's Register, DNV)**
- D) World Trade Organization (WTO)

9. In marine diesel engines, what is the primary purpose of turbocharging?

- A) To cool the exhaust gases before they enter the atmosphere
- B) To increase the power output by forcing more air into the cylinders**
- C) To reduce the noise levels of the engine
- D) To improve the efficiency of the fuel injection system

10. The concept of 'Metacentric Height' (GM) is crucial for ship stability. A positive GM indicates what?

- A) The ship is unstable and will capsize easily.
- B) The ship has an initial tendency to return to its upright position after being heeled.**
- C) The ship's center of gravity is above its center of buoyancy.
- D) The ship's stability is independent of its hull shape.

11. What is the fundamental principle behind the operation of a marine gas turbine engine?

- A) Reciprocating combustion of fuel in cylinders
- B) Expansion of high-pressure steam to drive turbines
- C) Continuous combustion of fuel, driving a turbine via expanding gases**
- D) Electromagnetic induction to generate thrust

12. In terms of maritime communication, what does AIS stand for and what is its primary function?

- A) Automated Information System; for ship-to-shore data transfer
- B) Automatic Identification System; for broadcasting and receiving ship identification and navigation data**
- C) Advanced Imaging System; for underwater surveillance
- D) Asset Integrity System; for monitoring vessel structural health

13. Which international convention establishes the framework for the prevention of pollution from ships, including oil, noxious liquid substances, and garbage?

- A) SOLAS Convention
- B) MARPOL Convention**
- C) STCW Convention
- D) Load Lines Convention

14. What is the primary advantage of using bulbous bows on large merchant vessels?

- A) To increase stability in rough seas
- B) To reduce wave-making resistance at the bow**
- C) To improve maneuverability in confined spaces
- D) To provide additional buoyancy for cargo

15. In marine electrical systems, what is the primary function of a frequency converter (variable frequency drive - VFD) when applied to electric motors, such as those driving pumps or thrusters?

- A) To increase the voltage supplied to the motor
- B) To regulate the speed of the motor by varying the frequency of the electrical supply**
- C) To convert AC power to DC power for battery charging
- D) To protect the motor from electrical surges

16. What is the purpose of a ship's bilge system?

- A) To ventilate cargo holds
- B) To remove water and oily residues that accumulate in the lowest parts of the ship**
- C) To supply fresh water to crew accommodations
- D) To extinguish fires in engine rooms

17. Which type of marine radar system uses Doppler shift to detect targets and distinguish between stationary and moving objects, improving situational awareness?

- A) Pulsed radar
- B) Continuous Wave (CW) radar
- C) Doppler radar**
- D) Frequency Modulated Continuous Wave (FMCW) radar

18. What is the main safety concern addressed by the International Convention for the Safety of Life at Sea (SOLAS)?

- A) Environmental pollution from ships
- B) Working conditions and welfare of seafarers
- C) Minimum safety standards for ship construction, equipment, and operation**
- D) Prevention of piracy and armed robbery at sea