

OPERATIONAL PROCEDURES, BASIC HOTEL SERVICES AND SHIP CONSTRUCTION**Attempt ALL questions****Marks for each part question are shown in brackets**

1. State TEN routine watchkeeping duties to be carried out by the duty watchkeeping engineer. (10)

2. With reference to Oily Water Separators (OWS) and the pumping of bilges, explain EACH of the following:
 - (a) why a positive displacement pump is preferable to a centrifugal pump as the main bilge pump; (2)
 - (b) why it is important that the flow rate to the separator is not exceeded; (2)
 - (c) why the discharge overboard line should be higher than the OWS; (2)
 - (d) how detergents used for bilge cleaning can affect the operation of the separator; (2)
 - (e) why an air release is fitted to the top of the shell of the OWS, (2)

3. With reference to marine diesel oil:
 - (a) define EACH of the following terms, stating the unit used in EACH:
 - (i) density; (2)
 - (ii) viscosity; (2)
 - (iii) flash point. (2)
 - (b) excluding the THREE terms listed in part (a), state FOUR items of information contained on a Bunker delivery note. (4)

4. With reference to sewage treatment plants:
 - (a) state the purpose of the vent, and explain why it is fitted with a gauze; (3)
 - (b) explain the difference between aerobic and anaerobic micro organisms; (3)
 - (c) explain why air is bubbled through the effluent in the aeration tank; (2)
 - (d) explain why calcium hypochlorite is added to the treated sewage before discharge overboard. (2)

- (a) State FOUR areas of an air conditioning system where the Legionella Bacteria may develop. (4)
- (b) Detail the inspections and treatment to be carried out in THREE of the areas stated in part (a). (6)
6. With reference to reverse osmosis plants:
- (a) explain the treatment that the feedwater undergoes to prevent blockage of the membranes; (3)
- (b) describe how the purity of the water is measured and protected, stating the limits on purity set by the World Health Organisation; (5)
- (c) outline the further treatment the permeated water undergoes before it can be used for domestic purpose. (2)
7. With reference to the motion of a vessel in the water:
- (a) list the SIX degrees of freedom, describing the meaning of EACH term; (6)
- (b) sketch the position of a *bilge keel*, describing how it reduces vessel motion. (4)
8. (a) Explain the need for fitting, location, and operation of an engine room fire main isolation valve. (4)
- (b) State the type of valve used in part (a). (1)
- (c) Describe, with the aid of a sketch, the construction of a sprinkler head. (5)
9. Describe, with the aid of a sketch, the construction and operation of a *thermistor* type rate of rise heat detector. (10)
10. (a) State the meaning of EACH of the following terms in relation to a vessel's size:
- (i) gross tonnage; (2)
- (ii) net tonnage; (1)
- (iii) lightweight; (2)
- (iv) deadweight; (2)
- (v) displacement. (2)
- (b) State the relationship between Lightweight, Deadweight and Displacement. (1)