

AUXILIARY EQUIPMENT PART I

Attempt ALL questions

Marks for each part question are shown in brackets

1. (a) Sketch a flexible diaphragm valve. (6)
- (b) Describe how the diaphragm is replaced, stating the precautions that should be taken. (4)

2. (a) Sketch a vane type pump, labelling ALL components. (6)
- (b) Explain the operation of the pump sketched in part (a). (4)

3. With reference to reciprocating air compressors:
 - (a) state the meaning of the term *bump clearance*; (2)
 - (b) explain the effects on operation if the bump clearance is:
 - (i) too large; (3)
 - (ii) too small. (3)
 - (c) explain how an aftercooler helps remove moisture from the air. (2)

4. Outline the safety precautions which should be taken when carrying out repairs or maintenance on hydraulic systems. (10)

5. Describe, with the aid of a block diagram, the control of an automatic steering system, including auto-pilot and valve operated steering gear. (10)

6. With reference to controllable pitch propellers:
 - (a) explain why they should maintain a small amount of pitch when in the neutral position; (3)
 - (b) state, with reasons, the failsafe position; (4)
 - (c) explain how pitch may be restored should hydraulic system failure occur. (3)

7. With reference to comparing modern water lubricated stern tube bearings with those that are oil lubricated:
- (a) state THREE advantages; (3)
 - (b) state THREE disadvantages, explaining how EACH may be overcome. (7)
8. With reference to propulsion shaft intermediate bearings of the plain bearing type, explain EACH of the following:
- (a) how change of alignment due to vessel condition is allowed for; (2)
 - (b) why the shaft must be able to move longitudinally; (4)
 - (c) why the aftmost bearing requires a complete bush but other bearings may have the bush only in the lower half. (4)
9. (a) State the requirements for the positioning of the emergency source of electrical power. (4)
- (b) List EIGHT areas that must have emergency lighting services. (6)
10. Outline the necessary precautions, as stated in the Code of Safe Working Practices for Merchant Seamen, for working near live electrical equipment, when it is essential for the safety of the ship or for testing purposes. (10)