OPERATIONAL PROCEDURES AND BASIC HOTEL SERVICES

Attempt ALL questions

Marks for each question are shown in brackets

1. With reference to the engine room log book:

   (a) state THREE reasons for keeping such a log book; (6)

   (b) state EACH of the following:

   (i) the person responsible for its compilation; (1)

   (ii) the interval at which it should be written up and signed; (1)

   (iii) the procedure to be followed if a correction of entry is required; (1)

   (iv) the purpose of recording a general abstract for main and auxiliary engines. (1)

2. With reference to manual shipboard fuel oil transfers:

   (a) explain the risks of handing over the watch whilst the transfer is taking place; (4)

   (b) explain the procedure necessary if the transfer cannot be completed before the watch is handed over; (3)

   (c) state the subsequent action to be taken by the relieving engineer after the action explained in Q2(b) has been taken. (3)

3. With reference to routine watchkeeping, list TEN duties of the Engineer Officer of a watch. (10)

4. With reference to the safe bunkering of marine gas oil fuel:

   (a) list SIX actions that should be taken prior to and during the loading; (6)

   (b) state FOUR tests to be carried out on the fuel to ensure that it is uncontaminated. (4)

5. With reference to cleaning agents used in machinery spaces:

(a) explain what is meant by a *quick separating detergent*; (2)

(b) describe how to carry out a test to determine whether or not a proposed cleaning agent is suitable for use in a machinery space employing an oily water separator to lower the bilges; (6)

(c) explain why a centrifugal pump is unsuitable for use as a bilge pump when using an oily water separator. (2)

6. Sketch the basic standard symbols for EACH of the following components in a hydraulic system:

(a) variable delivery pump; (2)

(b) direction control valve; (2)

(c) non return valve; (2)

(d) relief valve; (2)

(e) hydraulic motor. (2)

7. With reference to hydraulic systems:

(a) state THREE ways in which water may be present in a hydraulic system; (3)

(b) describe the procedure to be carried out to check for water contamination; (5)

(c) state TWO possible consequences of operating a system contaminated with water. (2)

8. Describe, with the aid of a sketch a refrigeration plant associated with a chilled water air conditioning plant, indicating relevant pressures and temperatures around the system. (10)

9. With reference to superchlorination of fresh water tanks:

(a) state TWO occasions when this should be carried out; (2)

(b) list the procedure to be followed. (8)

10. With reference to sewage treatment plants:

(a) explain the difference between *black water* and *grey water*; (2)

(b) explain the difference between aerobic and anaerobic micro organisms; (3)

(c) list THREE dangerous gases produced under anaerobic conditions; (3)

(d) explain the dangers of producing the gases listed in Q10(c) in a confined space. (2)

OPERATIONAL PROCEDURES AND BASIC HOTEL SERVICES NOV '03

Attempt ALL questions

Marks for each question are shown in brackets

1. With reference to the engine log books, explain the reasons for recording EACH of the following, and the effect on the engine should the temperatures be outside the normal parameters:

   (a) exhaust temperatures; (3)

   (b) cooling water inlet/outlet temperature; (3)

   (c) lubricating oil temperature. (4)

2. (a) State, with reasons, where the watch should be handed over on a vessel fitted with a UMS system, where the period of duty is 24 hours. (2)

   (b) Outline the responsibility of the duty engineer with respect to EACH of the following:

   (i) the Systems Status Board; (3)

   (ii) the Oil Record Book; (3)

   (iii) the main and auxiliary Machinery Maintenance Record Book. (2)

3. (a) List SIX alarms or protection devices which must be fitted to a main propulsion engine operating in an unmanned machinery space. (6)

   (b) State the FOUR human senses that are employed by the duty engineer when carrying out routine inspections of an unmanned machinery space. (4)

4. With reference to microbiological contamination of marine gas oil:

(a) state which contaminants must be present for the microbes to live and multiply; (2)

(b) describe the effect of microbiological growth in the fuel; (2)

(c) explain how the contamination may be detected; (2)

(d) state how the risk of contamination may be reduced; (2)

(e) explain how the contamination may be removed. (2)

5. Sketch a cross section through an oily water separator that would limit the discharge of oil to 15ppm, indicating how fluid separation takes place. (10)

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6. With reference to compressed air systems for the production of air for control and general service purposes:

(a) state the purpose of an air receiver; (2)

(b) explain why moisture and oil carryover are undesirable in the compressed air; (4)

(c) explain what is meant by an oil free compressor; (2)

(d) explain how an aftercooler helps remove moisture from the air. (2)

7. Sketch a variable delivery hydraulic system using the standard symbols and labelling the MAIN components. (10)

8. With reference to the monitoring of air conditioning systems:

   (a) explain the purpose of a hygrometer; (2)

   (b) describe an alternative method which will achieve the same result if a hygrometer is not available; (4)

   (c) state FOUR main areas which are considered to be a breeding ground for bacteria. (4)

9. Explain, with the aid of a sketch, EACH of the following:

   (a) the osmosis principle; (5)

   (b) reverse osmosis. (5)

10. With reference to sewage treatment plants:

   (a) state the recommended inspection intervals; (1)

   (b) describe the checks and maintenance which should be carried out. (9)

OPERATIONAL PROCEDURES AND BASIC HOTEL SERVICES

JUN 05

Attempt ALL questions

Marks for each question are shown in brackets

1. With reference to the engine room log book:

   (a) outline THREE reasons for keeping such a log book; **(6)**

   (b) state EACH of the following;

   (i) the person responsible for its compilation; **(1)**

   (ii) the interval at which it should be written up and signed; **(1)**

   (iii) the procedure to be followed if a correction of entry is required; **(1)**

   (iv) the purpose of recording a general abstract for main and auxiliary engines. **(1)**

2. *(a)* Explain the purpose of the Systems Status Board. **(4)**

   (b) List SIX examples of information which may be recorded on the System Status Board. **(6)**

3. *(a)* State the meaning of the term *Machinery Space*. **(2)**

   (b) State TWO precautions which should be listed on a notice outside an unmanned machinery space. **(2)**

   (c) State, with reasons, the procedure to be followed prior to entry into an unmanned machinery space. **(3)**

   (d) State, with reasons, the precautions to be adopted by a person alone in the machinery space. **(3)**

4. With reference to anti-pollution procedures:

   (a) state the FOUR requirements of a Shipboard Oil Pollution Emergency Plan (SOPEP); **(8)**

   (b) state the name of the IMO regulation which deals with the prevention of pollution by oil. **(2)**

JUN 01

5. With reference to Oily Water Separators 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)**

6. Describe, with the aid of a sketch, the **operating principle** of a variable delivery radial piston pump. **(10)**

7. *(a)* State THREE advantages and THREE disadvantages of a hydraulic system compared to an electrical system used to power a vessels' windlasses and capstans. **(6)**

(b) State FOUR circumstances when flushing of a hydraulic system may be necessary. **(4)**

8. *(a)* List THREE safety devices fitted to a refrigeration compressor, stating which device resets automatically. **(4)**

(b) Explain EACH of the following:

(i) why air in a refrigeration circuit is undesirable; **(2)**

(ii) how air may enter a refrigeration circuit. **(2)**

(c) Describe how air may be removed from a refrigeration system. **(2)**

9. Sketch a fresh water evaporator which uses the engine cooling water as a heat source. **(10)**

10. With reference to the inspection and maintenance of sewage treatment plants:

(a) state the recommended survey interval; **(1)**

(b) describe the inspections and checks which should be included during a survey. **(9)**

OPERATIONAL PROCEDURES AND BASIC HOTEL SERVICES

Attempt ALL questions

Marks for each question are shown in brackets

1. With reference to the engine log books, explain the reasons for recording EACH of the following:

   (a) running hours; **(2)**

   (b) lubricating oil consumption; **(2)**

   (c) fuel consumption; **(2)**

   (d) salinity or chloride content of the engine jacket cooling water; **(2)**

   (e) water content of lubricating oil. **(2)**

2. With reference to a vessel fitted with a UMS system, where the period of duty is 24 hours:

   (a) state, with reasons, where the watch should be handed over; **(2)**

   (b) outline, with reasons, the responsibility of the off going duty engineer with respect to EACH of the following;

   (i) the Systems Status Board; **(3)**

   (ii) the Oil Record Book; **(3)**

   (iii) the main and auxiliary Machinery Maintenance Record Book. **(2)**

3. Describe the complete procedure for changing over and replacing a duplex type oil filter fitted on the discharge side of a pump. **(10)**

4. With reference to microbiological contamination of marine gas oil:

(a) state which other contaminant must be present for the microbes to live and multiply; **(1)**

(b) describe the effect of microbiological growth in the fuel; **(3)**

(c) explain how the contamination may be detected; **(2)**

(d) state how the risk of contamination may be reduced; **(2)**

(e) explain how the contamination may be removed. **(2)**

5. With reference to Oily Water Separators and the pumping of bilges:

(a) state the limit on oil discharge; **(1)**

(b) list FOUR items of information which must be recorded in the Oil Record Book when bilges are pumped overboard using a non automatic system; **(4)**

(c) state what should happen if the content of the oil in the discharge overboard is detected as exceeding the limit set using an automatic system; **(2)**

(d) list THREE conditions/faults which interfere with oil water separation. **(3)**

6. Sketch an air compressor suitable for providing air for SCUBA air bottles. **(10)**

7. With reference to a ship's deck hydraulic powerpack system:

(a) state THREE items of machinery which may be powered by such a system; **(3)**

(b) (i) state, with reasons, where an accumulator is fitted to the system; **(2)**

(ii) describe how individual items of machinery are prevented from exceeding their safe working load; **(2)**

(iii) state how hydraulic oil is prevented from short circuiting back through non running pumps; **(1)**

(iv) explain the purpose of the pump unloading switch. **(2)**

8. With reference to the risk of Legionella bacteria in air conditioning plants:

(a) state, with reasons, FOUR main areas of concern which are considered to be a breeding ground for the bacteria; **(8)**

(b) describe how the risks of the existence of the bacteria can be reduced. **(2)**

9. Explain, with the aid of sketches, **the principle** of reverse osmosis as a method of producing fresh water. **(10)**

10. *(a)* Explain the difference between aerobic and anaerobic microorganisms. **(2)**

(b) List the main components of an aerobic sewage treatment plant, stating their purpose. **(7)**

(c) Explain how oxygen is introduced into an aerobic sewage treatment plant. **(1)**

Attempt ALL questions

Marks for each question are shown in brackets

1. *(a)* Write an engine room log book entry in the event of a vessel running aground. **(4)**

   (b) (b) State SIX **routine** activities which would require an engine room log book entry. **(6)**

2. List FIVE checks that should be made before taking over a main and auxiliary machinery space watch, stating a reason for EACH check. **(10)**

3. With reference to unmanned machinery spaces:

   (a) explain why machinery spaces should be visited on a regular basis; **(6)**

   (b) explain the procedure to be adopted if a person wishes to enter a machinery space outside normal working hours. **(4)**

4. With reference to bunkering of fuel:

   (a) list THREE possible contaminants which could be found in marine gas oil bunkers; **(3)**

   (b) describe the action to be taken in the event of EACH of the contaminants listed in Q4*(a)* being present; **(6)**

   (c) state the length of time a fuel oil sample should be retained on board. **(1)**

5. With reference to Oily Water Separators and the pumping of bilges, explain the purpose of EACH the following:

   (a) a bilge holding tank; **(2)**

   (b) an oil drain tank; **(2)**

   (c) an oil content discharge monitor; **(2)**

   (d) a vacuum breaker; **(2)**

   (e) an oil detection probe. **(2)**

6. With reference to hydraulic system diagrams:

(a) sketch the symbols for EACH of the following:

(i) a variable delivery pump; **(2)**

(ii) a hydraulic actuator; **(2)**

(iii) a relief valve; **(2)**

(iv) an accumulator. **(2)**

(b) sketch the symbol convention for EACH of the following;

(i) pipes crossing, but not connected; **(1)**

(ii) pipes joined. **(1)**

7. With reference to hydraulic systems:

(b) state FOUR applications for a hydraulic system on board a vessel; **(4)**

(c) state the effects and possible causes of EACH of the following;

(i) air in the system; **(2)**

(ii) dirt and foreign particles in the system; **(2)**

(iii) separated water in the system. **(2)**

FEB 03

8. *(a)* State the THREE basic principles of refrigeration. **(3)**

(b) Sketch a direct expansion free standing mechanical refrigeration system, labelling the principle components and indicating where EACH of the three principles stated in Q3*(a)* occurs. **(7)**

9. 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 must undergo before it can be used for domestic purposes. **(2)**

10. Describe the operating process of an aerobic digestion sewage treatment plant from receiving the waste to discharge overboard. **(10)**

OPERATIONAL PROCEDURES AND BASIC HOTEL SERVICES

Attempt ALL questions

Marks for each question are shown in brackets

1. *(a)* List EIGHT operating parameters which should be recorded in the main and auxiliary engine room log books. **(4)**

   (b) In the event of a cylinder exhaust temperature pyrometer being suspected of giving an incorrect reading, outline EACH of the following:

   (i) the information to be recorded in the log book; **(2)**

   (ii) the action to be taken to verify the pyrometer reading; **(2)**

   (iii) the action to be taken if the pyrometer is found to be faulty. **(2)**

2. With reference to manual fuel oil transfers:

   (a) explain the risks of handing over the watch while the transfer is taking place; **(4)**

   (b) explain the procedure necessary if the transfer cannot be completed before the watch is handed over; **(3)**

   (c) state the subsequent action to be taken by the relieving engineer after the action explained in Q2*(b)* has been taken. **(3)**

3. Describe the method of testing EACH of the following:

   (a) a bilge high level alarm switch; **(3)**

   (b) a diesel engine lubricating oil shut down pressure switch; **(4)**

   (c) a cooling water high temperature alarm probe. **(3)**

4. List FIVE precautions to be observed before taking on bunkers, stating a reason for EACH precaution. **(10)**

5. Describe, with the aid of sketches, the operating principles of a two stage oily water separator designed to limit the oil content of discharge to 15ppm. **(10)**

JAN 03

6. With reference to air compressors and pneumatic control systems:

(a) state ONE advantage and ONE disadvantage of a compressed air system compared to a hydraulic system; **(2)**

(b) (i) explain why it is desirable to remove moisture from the air; **(2)**

(ii) explain why it is desirable to limit oil carry over; **(2)**

(c) describe how EACH of the following is achieved:

(i) removal of moisture from the air; **(2)**

(ii) limiting of oil carry over. **(2)**

7. Sketch an open loop constant pressure hydraulic system incorporating EACH of the following: **(10)**

- fixed capacity pump
- pressure control valve
- flow control valve
- change over valve
- reversible motor

8. With reference to refrigeration systems:

(a) explain the purpose of the secondary temperature scale on a discharge pressure gauge; **(3)**

(b) in certain circumstances it may be necessary to pump the refrigerant charge in a system over to the condenser/liquid receiver;

(i) state THREE reasons why this may be necessary; **(3)**

(ii) describe how this is done. **(4)**

9. With reference to superchlorination of fresh water tanks:

(a) state TWO examples of when this should be carried out; **(2)**

(b) list the procedure to be followed. **(8)**

10. With reference to sewage treatment plants:

(a) describe the **operating principle** of an aerobic biological sewage treatment plant; **(4)**

(b) explain the dangers if a supply of oxygen is not present; **(4)**

(c) state how a sufficient supply of oxygen is ensured. **(2)**

OPERATIONAL PROCEDURES AND BASIC HOTEL SERVICES Nov '02.

Attempt ALL questions

Marks for each question are shown in brackets

1. With reference to compiling Machinery Running Log Sheets for individual items of auxiliary machinery, on newly constructed vessels:

   (a) list SIX types of data required to be recorded for an auxiliary machine; (6)

   (b) state the periodicity when entries should be made in the log; (2)

   (c) state a method that should be employed to assist relief engineers in understanding whether or not a particular item of data is within acceptable parameters. (2)

2. As a member of an engine room watch there is a requirement to carry out routine inspections of machinery located in remote unmanned spaces:

   (a) explain the precautions that should be taken to ensure the safety of personnel; (6)

   (b) state FOUR notices that should be posted at the entrance of these machinery spaces. (4)

3. List TEN actions that should be taken to ensure safe bunkering of fuel oil. (10)

4. With reference to cleaning agents for use in machinery spaces:

   (a) explain what is meant by a *quick separating detergent*; (3)

   (b) describe how to carry out a reference test for determining whether or not a proposed cleaning agent is suitable for use in any machinery space. (7)

5. With reference to hydraulic systems:

(a) list THREE occasions when tests should be carried out for possible water contamination; (3)

(b) describe the test necessary to check whether or not a hydraulic system has become contaminated by water. (7)

6. With reference to refrigeration:

(a) state the THREE basic laws that apply; (3)

(b) describe how each of the laws stated in Q6(a) is employed to make the refrigeration process possible. (7)

7. Sketch a *direct expansion R22 refrigeration system*, stating the pressures and temperatures expected at various points on the system. (10)

8. Sketch a *reverse osmosis* water making system, describing the function of the MAIN components shown. (10)

9. Describe the precautions to be taken, after major refit, to ensure a vessel meets the regulations for the loading of potable water. (10)

10. *(a)* List the limitations that the International Maritime Organisation has defined on the discharge of sewage in international waters. (6)

(b) Describe how the effluent discharge from an *aerobic sewage* treatment plant is tested, stating the limits which are to be adhered to. (4)

(END OF QUESTION PAPER)

Attempt ALL questions

Marks for each question are shown in brackets

1. With reference to the maintenance of main and auxiliary machinery, list the information that should be recorded in the engine room log book. (10)

2. Outline the duties of the Engineer Officer of a Watch. (10)

3. With reference to the bunkering of fuel oil, list TEN actions that should be taken to ensure safe bunkering. (10)

4. After bunkering marine gas oil it is found that engine performance deteriorates as a result of fuel filter blockage:

   (a) list FOUR possible causes of contamination; (4)

   (b) list the measures that should be taken to remove EACH type of contamination given in your answer to Q4(a). (6)

5. Sketch a cross section of an *oily water separator*, indicating how fluid separation takes place. (10)

6. With reference to hydraulic hygiene:

   (a) outline the THREE states in which water may be found in a hydraulic system; (6)

   (b) describe TWO sources of water contamination. (4)

7. With reference to the operation of compressed air systems:

   (a) state the dangers that are presented by allowing oil vapour and moisture to build up in compressed air storage bottles and receivers; (4)

   (b) explain how a typical *low pressure air compressor* is constructed in order to prevent oil vapour and water vapour *carry over* from occurring. (6)

8. Describe, with the aid of a sketch, the operation of the components in a typical gas system employed in a *free standing air conditioning plant.* (10)

9. With reference to fresh water systems:

(a) describe copper staining; (4)

(b) describe a treatment process to prevent copper staining. (6)

10. With reference to the treatment of effluent discharged from sewage treatment plants:

(a) list the dangers that are presented when using calcium hyperchlorate as the disinfecting agent; (5)

(b) state the precautions that should be adopted when storing and handling calcium hyperchlorate in a shipboard environment. (5)

(END OF QUESTION PAPER)

Attempt ALL questions

Marks for each question are shown in brackets

1. *(a)* State THREE documents that should be kept to record the day to day affairs of the Engine Room Department. (3)

   (b) Outline the entries that should be made in any ONE of the documents stated in Q1(a). (7)

2. List the information that should be recorded on the engine room status board, prior to handing over the watch. (10)

3. With reference to Marine Gas Oil becoming contaminated before it is offered as bunker fuel:

   (a) list FOUR possible contaminants that may be present; (4)

   (b) describe how EACH of the contaminants listed in Q3(a) would appear in a simple test of the fuel. (6)

4. With reference to the discharge of pollutants from ships drawn up by international agreement:

   (a) state the name of the International Authority responsible for overseeing the legislation; (1)

   (b) state the name of the appropriate convention; (1)

   (c) state the name of the regulation; (1)

   (d) describe the rules governing the discharge of oils and fuels in international waters; (3)

   (e) explain how the restrictions imposed might be effected by local port authority regulations. (4)

5. *(a)* Sketch a Variable Hydraulic System. (4)

(b) Describe the function of the system components sketched in Q5(a). (6)

6. With reference to Compressed Air Systems:

(a) describe, with the aid of a sketch, the air flow through a typical 4-Stage High Pressure Air Compressor; (6)

(b) discuss the importance of maintaining the correct 3rd and 4th Stage lubrication rates. (4)

7. *(a)* Explain how wet and dry bulb thermometers together with a Psychometric Chart should be employed to establish the efficiency of an air conditioning system. (6)

(b) Explain the term *Comfort Zone.* (4)

8. With reference to a refrigeration system, describe the effect of EACH of the following:

(a) an overcharge of gas; (5)

(b) air in the system. (5)

9. With reference to a Reverse Osmosis Potable Water making Plant:

(a) sketch a typical Spiral Wound Membrane; (5)

(b) describe how the membranes are cleaned and preserved when not in use. (5)

Jun '02.

10. With reference to an aerobic sewage treatment plant, describe EACH of the following:

(a) the pre treatment given to the effluent; (2)

(b) what is meant by the *aerobic digestion process;* (4)

(c) the post treatment carried out prior to the effluent being discharged overboard. (4)

(END OF QUESTION PAPER)

OPERATIONAL PROCEDURES AND BASIC HOTEL SERVICES MAY '02.

Attempt ALL questions

Marks for each question are shown in brackets

1 Describe the purposes of employing Engineering Officers on watchkeeping duties. (10)

2 *(a)* State the maximum noise levels that can be expected in the Normal Cruising State in EACH of the following spaces onboard a motor vessel:

(i) machinery space; (2)
(ii) control room; (2)
(iii) mess room. (2)

(b) State the noise level at which protection MUST be used in order to prevent permanent damage to the human ear. (2)

(c) Without the aid of noise measuring equipment, state what basic rule could be employed to determine whether or not the noise level in a machinery space dictated the need to adopt protection. (2)

3 *(a)* Describe the husbandry actions that should be taken in order to maintain bilges in an oil free state. (4)

(b) Describe the limitations that should be placed on cleaning and stripping bilges. (6)

4 With reference to an Oil Fuel Spillage Response Contingency Plan, list the actions to be taken in the event of a mishap occurring whilst bunkering a vessel. (10)

5 *(a)* As the Engineer Officer responsible for maintenance of the ship's hydraulic systems, list the occasions when tests should be carried out for possible water contamination. (3)

(b) Describe the test necessary to check whether or not a hydraulic system has become contaminated by water. (7)

6 With reference to constant pressure hydraulic pumps used in hydraulic systems:

(a) sketch a single Piston/Cylinder Unit of the type employed in a radial high-pressure pump, driven by a cam; (6)

(b) describe the operation of the pump sketched in Q6(a). (4)

7 With reference to a reverse osmosis water making plant:

(a) sketch a typical membrane element; (8)

(b) describe the treatment processes to be adopted to overcome the problem of the product water being corrosive and unpalatable. (2)

8 With reference to air conditioning systems onboard a vessel:

(a) explain how wet and dry bulb thermometers together with a Psychrometric Chart could be employed to establish whether the air conditioning system is functioning correctly or not; (6)

(b) explain the term *Comfort Zone.* (4)

9 Identify the areas associated with sewage treatment plants and sanitary systems that require particular attention when carrying out routine maintenance inspections, in order to prevent the formation of toxic and flammable gases. (10)

10 With reference to the operation of compressed air systems:

(a) state the dangers that are presented by allowing oil vapours and moisture to build up in compressed air storage bottles and receivers; (4)

(b) explain how a typical Low Pressure Air Compressor is constructed in order to prevent oil and water vapour *carry over* from occurring. (6)

(END OF QUESTION PAPER)

OPERATIONAL PROCEDURES AND BASIC HOTEL SERVICES FEB '02

Attempt ALL questions

Marks for each question are shown in brackets

1 With reference to the Machinery Running Log Sheets for individual items of Auxiliary Machinery, on a newly constructed vessel:

(a) list the typical parameters required to be recorded for an auxiliary machine; (6)

(b) state the periodicity when entries should be made; (2)

(c) indicate the method that should be employed to assist relief engineers and temporary staff in understanding whether or not a particular parameter is within tolerance. (2)

2 *(a)* List the FOUR basic human senses that can be employed by the presence of an Engineer carrying out routine machinery space inspections. (4)

(b) State the alarms and aids that would be installed in an unmanned machinery space in order to safeguard the compartment in the absence of watchkeeping personnel. (4)

(c) State the periodicity that should be adopted between carrying out alarm system functional checks. (2)

3 *(a)* Describe the most effective way of cleaning machinery space bilges in order to ensure that the operation of the oily water separating equipment fitted in a vessel is not degraded. (4)

(b) List the limitations that would be imposed upon the choice of cleaning fluids to be used in a machinery space, describing what factors would affect the decision making process. (6)

4 With reference to bunkering and the storage of fuel:

(a) list the fuel husbandry tasks that would be carried out on a regular basis in order to prevent the contamination of a vessel's fuel systems; (4)

(b) state the periodicity of regular tests that would be carried out on BOTH the fuel service and settling tanks. (6)

5 *(a)* With reference to British Standard 2917, sketch the basic symbol for EACH of the following components in a hydraulic system:

(i) Fluid Reservoir; (1)
(ii) Constant Pressure or Variable Delivery Pump; (1)
(iii) System Relief Valve; (1)
(iv) Direction Control Valve; (1)
(v) Hydraulic Actuator or a hydraulic Motor. (1)

(b) Describe the function of EACH of the components sketched in Q5(a). (5)

6 *(a)* Outline the THREE states in which water may be found in a Hydraulic System. (6)

(b) Outline TWO sources of water contamination. (4)

7 *(a)* Describe the actions that should be taken to ensure that potable water taken from shore and embarkation hoses are maintained in a germ free state. (5)

(b) State the tests that would be taken and the records that should be maintained in order to demonstrate to any Inspecting Health Authority that the potable water storage and distribution system on board has been maintained to provide water safe for human consumption. (5)

8 *(a)* Outline the precautions that should be taken when handling cylinders containing refrigerant gas. (3)

(b) State the conditions necessary to ensure the safe storage of cylinders containing refrigerant gas. (7)

9 Describe, with the aid of a sketch, a Basic Direct Expansion Refrigeration Plant employing seawater as its cooling medium. (10)

10 With reference to Biological Sewage Treatment, describe the inspection routines that should be carried out to ensure safe plant operation. (10)

(END OF QUESTION PAPER)

OPERATIONAL PROCEDURES AND BASIC HOTEL SERVICES

JAN '02

Attempt ALL questions

Marks for each question are shown in brackets

1 As the Engineer Officer of the Watch in a large motor vessel that employs a wandering engineer as part of the watch compliment, describe the procedures that should be adopted to ensure the safety of the engineer during inspections of external machinery. (10)

2 With reference to the Oily Water Separator:

(a) describe the principle that allows separation of oil and water to take place; (4)

(b) sketch an Oily Water Separator used in the marine application. (6)

3 With reference to the regulations regarding the discharge of pollutants from ships drawn up by international agreement:

(a) state the governing body formed to oversee this agreement and the Convention; (2)

(b) describe the conditions that are laid down for the discharge of oil and fuel at sea; (4)

(c) explain how the restrictions imposed may be effected by Port Authority and Port State Control Regulations; (2)

(d) explain the meaning of the term *Special Areas.* (2)

4 With reference to bunkering a vessel:

(a) describe the effect surfactant contamination may have upon diesel fuel; (2)

(b) describe a simple test for surfactants. (8)

5 With reference to a vessel's hydraulic systems:

(a) list THREE occasions when hydraulic system flushing is carried out; (6)

(b) describe how effective flushing is achieved. (4)

6 Sketch a reverse osmosis water making system, describing the function of the components shown. (10)

7 Describe how fresh water systems can be treated in order to prevent copper staining occurring in a vessel's laundries and wash places. (10)

8 Describe, with the aid of a sketch, the operation of the components in a typical gas system employed in a free standing air conditioning plant. (10)

9 With reference to a refrigeration system:

(a) describe how an overcharge of gas in the system will affect the efficiency; (5)

(b) explain how air in the gas system might affect plant efficiency. (5)

10 With reference to sewage storage and treatment:

(a) describe the circumstances that will cause anaerobic conditions; (5)

(b) state the actions that should be taken to minimise the risk of anaerobic conditions occurring. (5)

(END OF QUESTION PAPER)

OPERATIONAL PROCEDURES AND BASIC HOTEL SERVICES Nov '01

Attempt ALL questions

Marks for each question are shown in brackets

1 With reference to taking over the watch as the Engineer Officer in charge of running machinery:

(a) state the information that should be given regarding the status of the machinery and systems; (7)

(b) list the aids that would be available to help you assimilate and retain the information stated in Q1(a). (3)

2 With reference to the use of the Oily Water Separator when lowering the engine room bilge:

(a) explain the effect of the oily/water feed rate on the equipment's performance; (5)

(b) describe the procedure that should be adopted to ensure that pollution of local waters does not occur. (5)

3 With reference to bunkering in a foreign port:

(a) state the actions that should be taken to ensure that the product being offered meets the required specifications; (3)

(b) describe simple visual tests to ensure that the fuel meets specifications. (7)

4 *(a)* Sketch a vessel's hydraulic steering system employing a variable delivery system to power the rudder actuator and constant pressure to service the power system. (5)

(b) Describe the function of the systems components sketched in Q4(a). (5)

5 *(a)* List FIVE basic functions required of a fluid selected for use in a hydraulic system. (5)

(b) Describe how a hydraulic fluid achieves the functions listed in Q5(a). (5)

/over

6 With reference to a reverse osmosis water making plant:

(a) state the effect of a build up of particulate matter on the membrane elements; (2)

(b) describe the pre-treatment given to raw water. (8)

7 *(a)* State THREE basic laws of refrigeration. (3)

(b) Describe how EACH of the laws stated in Q7(a) is employed to make the refrigeration process possible. (7)

8 *(a)* List the precautions that should be taken when handling cylinders containing refrigerant gas. (3)

(b) State the conditions to ensure safe storage of cylinders containing refrigerant gas. (7)

9 With reference to air compressors:

(a) state the advantages that can be gained by using a multi-stage compressor; (2)

(b) describe, with the aid of a sketch, how the multi-stage process is employed in practice to produce high-pressure air for storage and subsequent use in a vessel's high-pressure system. (8)

10 With reference to sewage treatment plants:

(a) describe the *Aerobic Digestion Process*; (6)

(b) describe the additional treatment that is carried out on completion of the *aerobic digestion process* to ensure all bacteria are killed off before the effluent is discharged overboard. (4)

[END OF QUESTION PAPER]

OPERATIONAL PROCEDURES AND BASIC HOTEL SERVICES SEP '01

Attempt ALL questions

Marks for each question are shown in brackets

1 A correctly compiled Engineering Log will contain data essential for the purpose of maintenance planning. List the information that should be included in the section used to record Main and Auxiliary Machinery details. (10)

2 As a Watch Keeping Engineer Officer there is a requirement to carry out routine inspections of a vessel's machinery some of which is located in remote unmanned spaces.

(a) Outline the precautions to be taken to ensure safety. (6)

(b) List the Notices that should be posted at the entrance to each machinery space to assist personnel in carrying out the task of inspecting machinery in a safe manner. (4)

3 Marine Gas Oil may become contaminated in storage before it is offered as bunker fuel.

(a) List FOUR possible contaminants that may be present. (4)

(b) Describe how each of the contaminants listed in Q3 (a) would appear in a simple test of the fuel. (6)

4 There is a requirement to lower the level of the engine room bilge as it is considered to present a fire risk. Explain what equipment, including cleaning agents, should be used and the precautions that should be taken to ensure that pollution of the local sea areas does not occur. (10)

5 With reference to Compressed Air Systems:

(a) describe, with the aid of a sketch, the air flow through a typical 4 – Stage High Pressure Air Compressor; (6)

(b) discuss the importance of maintaining the correct 3rd and 4th Stage lubrication rates. (4)

6 As the Engineering Officer responsible for the vessel's Air Conditioning Plant and Ventilation Systems discuss the precautions to be taken to ensure the required health and hygiene standards are maintained. (10)

7 There is a requirement to brief some new members of the catering staff on the dangers that exist in entering food storage rooms onboard. Discuss the advice that should be given to them concerning the precautions to be taken to ensure safe entry to a fridge storage space. (10)

8 Describe, with the aid of a sketch, the operation of a Single Effect Distilling Plant of the type used to produce potable water. (10)

9 A Machinery Status Board is normally used to record the state of running machinery and systems at any one time. List the information that should be recorded on the board prior to handing over a watch. (10)

10 Whilst bunkering fuel a spillage is reported. State the actions that should be taken, listing the authorities that should be informed to minimise the risk to the environment. (10)

[END OF QUESTION PAPER]

6/01

OPERATIONAL PROCEDURES AND BASIC HOTEL SERVICES

Attempt ALL questions

Marks for each question are shown in brackets

1 A correctly compiled Engineering Log will contain data essential for machinery maintenance planning purposes. List the information that should be included in the section used to record Main and Auxiliary Machinery abstract. (10)

2 As a member of an Engine Room Watch there is a requirement to carry out routine inspections of the vessel's machinery some of which is located in remote unmanned spaces.

(a) What precautions should be taken to ensure your own safety from the time of commencement until the time your inspections are completed? (6)

(b) What Notices should be posted at the entrance to each machinery space to assist personnel in carrying out the task of inspecting machinery in a safe manner? (4)

3 When acting as the Duty Engineer aboard your vessel there is a requirement to bunker fuel. The fuel has been ordered from the local agent who is due to deliver it by road tanker.

(a) List all the actions that should be taken to ensure safe bunkering of the fuel, highlighting those that should be carried out by other departments. (5)

(b) Detail the checks that should be taken to ensure only usable fuel has been bunkered. (5)

4 After bunkering Marine Gas Oil in a foreign port it is found that engine performance deteriorates as a result of fuel filter blockage which keeps re-occurring.

(a) Describe the types of contamination which could be responsible for this happening. (4)

(b) List the measures taken to remove each type of contamination listed in Q4 (a), from fuel systems service and bunker tanks. (6)

5 Make a labelled sketch of a cross section of an Oily Water Separator and indicate on the sketch how fluid separation takes place. (10)

6 All Hydraulic Systems are designed in such a way as to ensure that they operate within Safe Working Limits. Discuss how this is achieved. (10)

7 Sketch and briefly describe a Chilled Water Air Conditioning Plant and show relevant pressures and temperatures around the system. (10)

8 With reference to the production of potable water describe the principle upon which a reverse osmosis takes place. Use simple sketches to illustrate your answer. (10)

9 With the aid of a simple sketch, describe the principles of operation of Potable Water Making Plants of the Vapour Compression type. (10)

10 The International Maritime Organisation has defined the limitations on the discharge of sewage in international waters.

(a) List these limitations. (6)

(b) Briefly describe the method of testing the effluent discharge from an aerobic sewage treatment plant. (4)

[END OF QUESTION PAPER]

OPERATIONAL PROCEDURES AND BASIC HOTEL SERVICES Y4- 23/2/01

Attempt ALL questions

Marks for each question are shown in brackets

1 A correctly compiled Engineering Log will contain data essential for machinery maintenance planning purposes. List the information that should be included in the section used to record Main and Auxiliary Machinery abstract. (10)

2 As an Engineer Officer responsible for personnel employed on watchkeeping duties within enclosed machinery spaces:

(a) describe the recommended maximum periods of time that should be allowed whilst being employed on duties in a noisy environment; (6)

(b) explain why these recommendations have been made. (4)

3 When acting as the Duty Engineer aboard your vessel there is a requirement to bunker fuel. The fuel has been ordered from the local agent who is due to deliver it by road tanker.

(a) List all the actions that should be taken to ensure safe bunkering of the fuel, highlighting those that should be carried out by other departments. (5)

(b) Detail the checks that should be taken to ensure only usable fuel has been bunkered. (5)

4 The regulations regarding the discharge of pollutants from ships have been drawn up by international agreement.

(a) State the name of the International Authority responsible for overseeing the legislation. (1)

(b) State the name of the Appropriate Convention. (1)

(c) Briefly describe the rules governing the discharge of Oils and Fuels in international waters. (4)

(d) Explain how the restrictions imposed might be affected by local port authority regulations. (4)

5 When referring to cleaning agents:

(a) explain what is meant by a Quick Separating Detergent; (4)

(b) describe how to carry out a suitable reference test for determining whether or not a proposed cleaning agent is suitable for use in any machinery space where separating equipment may exist. (6)

6 *(a)* Sketch a simple Constant Pressure Hydraulic System. (6)

(b) Briefly describe the function of the system components drawn in Q6 (a). (4)

7 There is a requirement to brief some new members of the catering staff on the dangers that exist in entering food storage rooms onboard. What advice should be given to them concerning the precautions to be taken to ensure safe entry to a fridge storage space? (10)

8 With the aid of a simple sketch describe the operation of a Single Effect Distilling Plant of the type used to produce potable water in older vessels. (10)

9 With reference to Sewage Treatment Plants:

(a) describe what is meant by the Aerobic Digestion Process; (4)

(b) describe what additional treatment is carried out on completion of the aerobic digestion process to ensure all bacteria are killed off before the effluent is discharged overboard. (6)

10 The International Maritime Organisation has defined the limitations on the discharge of sewage in international waters.

(a) List these limitations. (6)

(b) Briefly describe the method of testing the effluent discharge from an aerobic sewage treatment plant. (4)

[END OF QUESTION PAPER]

OPERATIONAL PROCEDURES AND BASIC HOTEL SERVICES Y4 - 26/1/01

Attempt ALL questions

Marks for each question are shown in brackets

1 List the duties assigned to the Engineer Officer of a Watch during the period that he/she has responsibility for the vessel's main and auxiliary machinery. (10)

2 A Machinery Status Board is normally used to record the state of running machinery and systems at any one time. List the information that should be recorded on the board prior to handing over a watch. (10)

3 Marine Gas Oil may become contaminated in storage before it is offered as bunker fuel.

(a) List FOUR possible contaminants that may be present. (4)

(b) Briefly describe how each of the contaminants described in Q3 (a) would appear in a simple test of the fuel. (6)

4 The regulations regarding the discharge of pollutants from ships have been drawn up by international agreement.

(a) State the name of the International Authority responsible for overseeing the legislation. (1)

(b) State the name of the Appropriate Convention. (1)

(c) Briefly describe the rules governing the discharge of Oils and Fuels in international waters. (4)

(d) Explain how the restrictions imposed might be affected by local port authority regulations. (4)

5 Make a labelled sketch of a cross section of an Oily Water Separator and indicate on the sketch how fluid separation takes place. (10)

6 Hydraulic system cleanliness plays an important part in maintaining the efficiency of modern hydraulics systems.

(a) List FIVE likely sources of contamination that might occur in a hydraulic system aboard your vessel. (5)

(b) Describe the steps that should be taken to eliminate the FIVE sources of contamination listed in Q6(a). (5)

7 *(a)* Make a sketch of the airflow through a typical *Two Stage* Low Pressure Air Compressor of the type that is used to deliver oil and moisture free air. (6)

(b) Describe the operation of the plant in Q7 (a), and show how the compressed air is delivered for storage in an oil and water free state. (4)

8 With reference to the refrigeration plants:

(a) list the precautions that should be observed to ensure personal safety when operating and maintaining the plant in the confines of machinery space in a small vessel; (4)

(b) carrying out a routine inspection of an operating plant, it is noticed that a drop in plant performance indicates a partial loss of the refrigerant charge. Describe the methods that can be employed to detect and locate the source of leakage. (6)

9 With reference to a Reverse Osmosis Potable Water-making Plant:

(a) make a simple sketch of a typical Spiral Wound Membrane; (5)

(b) describe how the membranes are cleaned and preserved when not in use. (5)

10 *(a)* State FIVE dangers that might exist when operating a Collection and Storage Sewage System in the confines of a small vessel. (5)

(b) Explain what precautions should be taken to ensure that the dangers stated in Q10 (a) are prevented. (5)

[END OF QUESTION PAPER]

OPERATIONALPROCEDURES AND BASIC HOTEL SERVICES Y4 - 10/11/00

Attempt ALL questions

Marks for each question are shown in brackets

1 As a member of an Engine Room Watch there is a requirement to carry out routine inspections of the vessel's machinery, some of which are located in remote unmanned spaces.

(a) State the precautions that should be taken to ensure your own safety from the time of commencement until the time your inspections are completed. (6)

(b) What Notices should be posted at the entrance to each machinery space to assist personnel in carrying out the task of inspecting machinery in a safe manner? (4)

2 A Machinery Status Board is normally used to record the state of running machinery and systems at any one time. List the information that should be recorded on the board prior to handing over a watch. (10)

3 Whilst bunkering fuel a spillage is reported. State the actions that should be taken and make a list of the authorities that should be informed to minimise the risk to the environment. (10)

4 Marine Gas Oil may become contaminated in storage before it is offered as bunker fuel.

(a) List FOUR possible contaminants that may be present. (4)

(b) Briefly describe how each of the contaminants described in Q4 (a) would appear in a simple test of the fuel. (6)

5 There is a requirement to lower the level of the engine room bilge as it is considered to present a fire risk. Explain what equipment, including cleaning agents, should be used and the precautions that should be taken to ensure that pollution of the local area does not occur. (10)

6 Hydraulic system cleanliness plays an important part in maintaining the efficiency of modern hydraulics systems.

(a) List FIVE likely sources of contamination that might occur in a hydraulic system aboard a vessel. (5)

(b) Describe the steps that should be taken to eliminate the FIVE sources of contamination listed. (5)

7 With reference to Compressed Air Systems:

(a) describe, with the aid of a sketch, the air flow through a typical 4 Stage High Pressure Air Compressor; (6)

(b) discuss the importance of maintaining the correct 3rd and 4th Stage lubrication rates. (4)

8 Make a simple sketch of a Direct Expansion R22 Refrigeration System, indicating the pressures and temperatures expected at various points on the system. (10)

9 *(a)* Sketch a Single Stage Reverse Osmosis Plant. (5)

(b) Briefly describe how the system in Q9 (a) produces potable water. (5)

10 Sewage Treatment Plants and Sewage Holding Systems present a number of dangers which operators need to be aware of to ensure the safety of all on board.

List the operation and maintenance checks that are necessary to ensure safe operation of the plants and systems. (10)

[END OF QUESTION PAPER]