Y3 / Y2

Chief Engineer Statutory and Operational Requirements

Example examination questions

Note: any example exam paper after September 2005 is based upon the new engineering syllabus, (ref MIN208).

CHIEF ENGINEER STATUTORY AND OPERATIONAL REQUIREMENTS

Attempt ALL questions

Marks for each question are shown in brackets

1. With reference to the IMO SOLAS Convention certification, as applicable to vessels of over 500gt and carrying no more than 12 passengers:

   (a) list the certificates that are issued, in order to prove compliance with the convention; (6)

   (b) state the period over which the certificates will remain valid from the date of issue; (2)

   (c) list SIX surveyable items that could be considered to come under the responsibility of the Chief Engineer Officer. (12)

2. (a) A vessel of 600gt has no record of past fuel consumptions.

   Calculate to TWO decimal places the safe quantity of fuel required for a voyage of 2500 miles at an average speed of 25 knots, if the designer's fuel coefficient is found to be 50500. (10)

   (b) State the actions that should be taken if the actual fuel consumption during a voyage is found to be higher than the calculated consumption. (6)

   (c) Describe the provisions that should be made to ensure an adequate stock of lubricating oil during an extended voyage. (4)

3. With reference to watchkeeping duties within machinery spaces:

   (a) list EIGHT essential items of information that must be made available to a relief watchkeeper prior to taking over a watch; (8)

   (b) state the circumstances under which it would be inappropriate for an officer in charge of an engineering watch to hand over responsibility to a relief watchkeeper; (4)

   (c) list EIGHT procedures and checks that should be undertaken in the event of the bridge informing the machinery space watch of the onset of extreme heavy weather. (8)

4. With reference to the Code of Safe Working Practices for Merchant Seamen:

   (a) explain the purpose of a *permit to work*; (4)

   (b) describe the content of a typical *permit to work*, listing the items that must be checked before work can start; (6)

   (c) describe the procedures necessary prior to entering an *enclosed space* under EACH of the following circumstances:

      (i) carrying out a routine inspection of the space; (5)

      (ii) carrying out hot work within the space. (5)

5. (a) Describe, with the aid of a sketch, a portable fire extinguisher suitable for use on EACH of the following classes of fire:

      (i) class A; (4)

      (ii) class B; (4)

      (iii) class E. (4)

   (b) Outline the initial steps that should be taken on discovering a fire. (8)

CHIEF ENGINEER STATUTORY AND OPERATIONAL REQUIREMENTS

Attempt ALL questions

Marks for each question are shown in brackets

1. With reference to a vessel's seaworthiness:

   (a) state FOUR reasons why it is important to isolate a vessel into floodable lengths by using watertight bulkheads; (8)

   (b) state where EACH of the FOUR most important watertight bulkheads are situated and which of the four is required to be of the strongest construction; (6)

   (c) state the precautions that should be taken, prior to departure from port, to reduce the risk of flooding. (6)

2. (a) State FOUR ways in which a large motor yacht may pollute the environment. (4)

   (b) With reference to the IMO MARPOL Convention Annex I:

      (i) list SIX *special areas*; (6)

      (ii) state what pumping restrictions are applied to a vessel within a *special area*; (4)

      (iii) state the document that must be carried in order to record pumping activities, listing the details that must be entered following EACH operation. (6)

3. With reference to the Code of Safe Working Practices for Merchant Seamen:

   (a) state the British Standard Specification colours for EACH of the following gas cylinders:

      (i) oxygen; (2)

      (ii) acetylene; (2)

      (iii) compressed air; (2)

      (iv) propane; (2)

   (b) safety signs are used to indicate hazards or controls, state the meaning of EACH of the following colour codes:

      (i) red; (2)

      (ii) yellow; (2)

      (iii) blue; (2)

      (iv) green; (2)

   (c) list FOUR safety signs that should be displayed at the entrance to machinery spaces. (4)

4. With reference to the periodical dry-docking of a vessel:

   (a) state FOUR reasons for dry-docking; (8)

   (b) describe THREE methods of testing a hull for watertight integrity; (6)

   (c) describe THREE methods of determining the extent of wastage on a steel hull. (6)

5 Describe how a Chief Engineer Officer of a large motor yacht, in consultation with the Master, would ensure that the vessel has sufficient consumables to safely complete a planned long ocean voyage. (20)

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CHIEF ENGINEER STATUTORY AND OPERATIONAL REQUIREMENTS

Attempt ALL questions

June 2005

Marks for each question are shown in brackets

1. With reference to The Code of Safe Working Practices for Merchant Seamen detailing special precautions when entering or working within an enclosed or confined space:

   (a) state THREE potentially life threatening hazards that may be present within such a space; (3)

   (b) outline the precautions to be taken in EACH of the following situations:

      (i) before entering an enclosed space; (8)

      (ii) whilst working within the space; (5)

   (c) state the safe reading limit that would be acceptable from EACH of the following:

      (i) an oxygen meter; (2)

      (ii) an explosimeter. (2)

2. (a) (i) Describe how the International Maritime Organisation (IMO) acts in changing maritime legislation. (6)

      (ii) State TWO examples of the Conventions produced by this organisation. (2)

   (b) Describe how an IMO draft convention is brought into force as *International Law*. (6)

   (c) The Maritime and Coastguard Agency (MCA) gives guidance to vessels by means of 'M' notes. State the THREE different types of 'M' notes, explaining the purpose of EACH type. (6)

3. With reference to fires:

   (a) state the THREE elements necessary for combustion to start; (3)

   (b) define FIVE potential hazards within the machinery spaces of a yacht that could give rise to, or support, combustion; (10)

   (c) describe the immediate and subsequent actions that should be taken by an individual on discovering a fire. (7)

4. With reference to watertight bulkheads forming an integral part of the construction of a vessel, state EACH of the following:

   (a) where EACH of the FOUR most important watertight bulkheads are situated; (8)

   (b) why the foremost watertight bulkhead is required to be of a stronger construction than the others; (6)

   (c) THREE reasons why it is important to isolate a vessel into floodable lengths by using watertight bulkheads. (6)

5 With reference to the planned maintenance of machinery on board a vessel:

   (a) explain why it could be potentially dangerous not to have some form of planned maintenance system in place; (6)

   (b) state THREE different plant operating criteria that could be used in setting up a planned maintenance system; (6)

   (c) describe how a planned maintenance system could be set up on a vessel with no previous record of maintenance. (8)

CHIEF ENGINEER STATUTORY AND OPERATIONAL REQUIREMENTS

Attempt ALL questions **April 2005**

Marks for each question are shown in brackets

1. With reference to dry docking procedures, state EACH of the following:

   (a) SIX items of information that would need to be passed to the contractors prior to arrival at the dry-dock facility; (6)

   (b) EIGHT parts of a vessel which a Classification Society surveyor would inspect during a dry-docking survey; (8)

   (c) SIX essential checks on a vessel that should be made before starting to re-flood the dock on completion of repairs. (6)

2. With reference to the STCW'95 machinery space watchkeeping requirements, state EACH of the following:

   (a) the purpose of *standing orders*; (4)

   (b) EIGHT instructions that may be included in the machinery space standing orders for a large motor yacht; (8)

   (c) EIGHT checks that should be made by a relieving engineer prior to taking over a watch. (8)

3. With reference to the International MARPOL Convention 73/78 Annex V – Garbage pollution, state EACH of the following:

   (a) (i) the FOUR categories of garbage that are covered by this regulation; (4)

   (ii) which categories of garbage may be disposed of between the three and twelve mile limits of a country's territorial waters; (2)

   (b) (i) the EIGHT *special areas* that apply to the disposal of garbage; (8)

   (ii) the restrictions that apply to the disposal of garbage within these *special areas*. (6)

4. (a) A vessel has no record of past fuel consumptions.
The details for the forthcoming voyage will be as follows:

Displacement	1800 tonnes
Range	3000 Nautical miles
Speed	20 Knots

Calculate, to TWO decimal places, the bunker requirements if the designer's fuel coefficient for the vessel is 52,000. (12)

Note: A reserve allowance should be made, bearing in mind that the voyage will be made across the Mid-Atlantic in the winter.

(b) Explain how the requirements for lubricating oil for the voyage would be established. (8)

5 The Code of Safe Working Practices for Merchant Seamen (C.O.S.W.P.) defines precautions that should be taken to reduce the risk of injury to people working within machinery spaces.

(a) List SIX working hazards and the associated recommended items of *personal protective equipment*. (12)

(b) List THREE warning signs that should be placed on the access doors to normally unattended machinery spaces. (6)

(c) State the maximum length of time that a person without ear protection can remain within a space, without the risk of potential hearing damage, if the sound level within the space is 110dB. (2)

CHIEF ENGINEER STATUTORY AND OPERATIONAL REQUIREMENTS March 2005

Attempt ALL questions

Marks for each question are shown in brackets

1. With reference to the International MARPOL Convention 73/78:

   (a) Annex I legislates for the disposal of machinery space bilge water, for vessels greater than 400 gross tonnes:

      (i) state the pumping restrictions that are applied within special areas; (8)

      (ii) state where the pumping operations are recorded, listing the details required to be entered; (6)

   (b) state THREE types of air pollutant listed under Annex VI of this convention. (6)

2. The Code of Safe Working Practice for Merchant Seamen states that *Permits to Work* must be obtained before certain tasks can be undertaken.

   With reference to the overhaul of a large electrically driven pump:

   (a) explain the reasons for issuing a *Permit to Work*; (6)

   (b) state SIX factors that should be checked prior to working on the pump; (12)

   (c) state the length of time over which it is recommended that a *Permit to Work* remains valid. (2)

3. With reference to the combustion of hydrocarbon gases within air:

   (a) sketch a diagram showing EACH of the following features: (12)

      - the point at which the atmosphere becomes inert
      - the variation in the upper and lower explosive limits
      - the inflammable zone

   (b) describe the precautions to be taken prior to carrying out hot work within an enclosed space. (8)

4. When planning for a long ocean passage, it is important that provision is made for the various consumables required.

   Describe FOUR factors that should be taken into consideration when calculating the necessary resources to safely complete the planned voyage. (20)

5 With reference to Classification Society survey requirements for a large motor yacht:

   (a) describe what is meant by the term *Continuous Survey*; (6)

   (b) list SIX separate types of machinery that are normally subject to Class survey; (6)

   (c) describe the circumstances under which a *Condition of Class* could be applied to the vessel and the implications that this would have for the future classification of the vessel. (8)

Attempt ALL questions

Marks for each question are shown in brackets

1. With reference to the International MARPOL Convention 73/78 – Annex IV:

   (a) state the restrictions that currently apply to the disposal of sewage for EACH of the following:

   (i) within four miles of the nearest land; (3)

   (ii) between four and twelve miles of the nearest land; (3)

   (iii) over twelve miles from the nearest land; (3)

   (b) state the provisions that have been made under the legislation for vessels in port; (4)

   (c) state why the limitations listed in Q1(a) have been placed on the disposal of sewage, in terms of health and damage to the environment. (7)

2. (a) List and define the SIX currently recognised categories of fire. (12)

   (b) List FOUR types of portable fire extinguisher, stating the different categories of fire for which EACH could be safely used. (8)

3. (a) A motor yacht requires a power output of 2000kW to achieve a speed of 16 knots. The quoted specific fuel consumption at this power is 0.31kg/kWh.

   Calculate EACH of the following, to TWO decimal places:

   (i) the fuel consumption per 24 hours of continuous steaming; (3)

   (ii) the fuel required for a voyage of 2800 nautical miles at the stated speed. (5)

   (b) Describe the actions that should be taken if it is found that, during the voyage, the fuel has been contaminated with water. (12)

4. With reference to lifting appliances:

(a) state FIVE constructional criteria that must be considered when selecting lifting gear; (5)

(b) state FOUR checks that are made when examining lifting hooks; (4)

(c) state where the result of testing is recorded and list the information required to be noted and displayed. (5)

(d) list the requirements for the training of operators, with reference to the operation of lifting plant. (6)

5 (a) Define EACH of the following terms:

(i) freeboard deck; (3)

(ii) bulkhead deck; (3)

(iii) floodable length; (4)

(iv) longitudinal stability. (2)

(b) State FOUR reasons why it is important to isolate a vessel into floodable lengths by using watertight bulkheads. (8)

CHIEF ENGINEER STATUTORY AND OPERATIONAL REQ **November 2004**

Attempt ALL questions

Marks for each question are shown in brackets

1. With reference to a vessel's longitudinal and transverse stability:

   (a) (i) define the term *free surface;* (2)

   (ii) describe, with the aid of sketches, the action of *free surface* on a vessel's stability; (8)

   (b) define EACH of the following terms:

   (i) freeboard deck; (3)

   (ii) bulkhead deck; (3)

   (iii) floodable length. (4)

2. (a) (i) Explain what is meant by the term *standing orders*. (2)

   (ii) State how *standing orders* relate to the responsibilities of the Chief Engineer Officer and of the Watchkeeping Engineers. (6)

   (b) State the circumstances under which it would be inappropriate for the officer in charge of an engineering watch to hand over responsibility to a relief. (4)

   (c) State EIGHT points of information that should be passed on by the officer in charge of an engineering watch to a relieving engineer. (8)

3. With reference to the Code of Safe Working Practices for Merchant Seamen:

   (a) define the term *enclosed space*, stating the particular hazards that may be present within such a space; (4)

   (b) list the precautions to be taken in EACH of the following situations:

   (i) before entering an enclosed space; (6)

   (ii) whilst working within the space; (6)

   (c) describe how the oxygen content of the atmosphere within an enclosed space may be sampled, stating the level of oxygen content below which it would be dangerous to enter or remain within the space. (4)

4. (a) Describe, with the aid of sketches, a typical machinery space CO_2 flooding system that uses a bank of separate CO_2 cylinders actuated by a pilot cylinder. (14)

(b) List the procedures that must be followed before releasing CO_2 into the machinery spaces. (6)

5. (a) The Maritime and Coastguard Agency (M.C.A.) gives guidance to vessels by means of 'M' notes. State the THREE different types of 'M' notes, explaining the purpose of EACH note. (9)

(b) State the purpose of the M.C.A. Large Yacht Code of Practice (Megayacht code). (7)

(c) State TWO examples of the conventions produced by the International Maritime Organisation (I.M.O.) (4)

04-2004

CHIEF ENGINEER STATUTORY AND OPERATIONAL REQUIREMENTS

Attempt ALL questions

Marks for each question are shown in brackets

1. With reference to the periodical dry-docking of a large motor yacht:

   (a) describe how a vessel would be prepared prior to entering the dry-dock, stating the essential information that would be required to be passed on to the dry-dock contractors; (8)

   (b) list the essential services that would be required to maintain the safety and habitability of the vessel during the docking period; (6)

   (c) list the safety checks that should be made to the vessel prior to re-flooding the dock. (6)

2. With reference to the International MARPOL Convention 73/78:

   (a) state FOUR categories of pollutant that are specified in MARPOL 73/78; (4)

   (b) with reference to the part of MARPOL 73/78 Annex 1 legislating for the disposal of machinery space bilge water within *special areas*:

      (i) list SIX special areas; (6)

      (ii) state the pumping restrictions that apply within special areas, for vessels over 400 GT. (10)

3. (a) Explain the potential dangers of attempting to run a large motor yacht without a planned maintenance system in place. (4)

   (b) Describe how a typical planned maintenance system based on running hours would be set up. (6)

   (c) (i) Explain what is meant by the term *condition monitoring*. (4)

      (ii) State, with reasons, THREE examples of parameters that could be recorded as part of a *condition monitoring* system. (6)

4. (a) Describe the process by which a leaking fuel injector pipe spraying onto an adjacent hot diesel engine exhaust manifold can lead to a sustainable fire. (10)

   (b) Describe how safety construction features and good housekeeping may prevent the scenario described in Q4(a) from developing. (10)

5. With reference to SOLAS 74 Chapter IX detailing the requirements of the International Safety Management Code:

(a) state the THREE objectives of the Code; (6)

(b) describe the role of the *designated person ashore*; (6)

(c) state EACH of the following:

(i) the TWO documents issued by the accrediting agency that demonstrate compliance with the Code; (4)

(ii) the requirements for inspection to ensure that both documents remain in force. (4)

09-03

CHIEF ENGINEER STATUTORY AND OPERATIONAL REQUIREMENTS

Attempt ALL questions

Marks for each question are shown in brackets

1. With reference to the current legislation for the inspection and testing of lifting appliances and loose lifting gear:

   (a) state the frequency of inspections and tests for EACH of the following:

      (i) lifting appliances; (3)

      (ii) loose lifting gear; (3)

   (b) state FOUR checks that are made when examining lifting hooks; (8)

   (c) state EACH of the following:

      (i) where the results of tests and examinations are recorded; (2)

      (ii) where samples of the necessary recording forms may be found; (2)

      (iii) the details that must be clearly marked on all lifting appliances and items of loose gear. (2)

2. With reference to watchkeeping requirements as set out in the STCW 95 code of practice:

   (a) state the conditions under which it would be inappropriate for the current watchkeeping engineer to hand over responsibility for the watch to another engineer; (4)

   (b) list SIX circumstances under which it may be necessary to increase the minimum manning of the machinery spaces; (12)

   (c) state the responsibilities of a watchkeeping engineer. (4)

3. (a) Sketch a typical fixed high expansion foam fire fighting installation. (12)

   (b) State EACH of the following:

      (i) TWO advantages for the use of high expansion foam; (4)

      (ii) TWO disadvantages for the use of high expansion foam. (4)

09-03

4. With reference to the International MARPOL Convention 73/78:

   (a) state FOUR categories of pollutant that are specified in MARPOL 73/78; (4)

   (b) MARPOL 73/78 Annex 1 legislates for the disposal of machinery space bilge water:

      (i) state the pumping restrictions applied within special areas; (8)

      (ii) state where pumping operations are recorded, outlining the details required to be entered. (8)

5. With reference to Classification Society survey requirements for a large motor yacht:

   (a) describe the role of the Surveyor during a dry-docking inspection, detailing items of the hull and associated external equipment that would require special examination; (14)

   (b) state THREE methods that could be used to determine the thickness of the hull plating. (6)

06-03

CHIEF ENGINEER STATUTORY AND OPERATIONAL REQUIREMENTS

Attempt ALL questions

Marks for each question are shown in brackets

1. With reference to dry-docking procedures:

   (a) state the arrangements that need to be made in order to maintain essential services on board a vessel; (6)

   (b) state the parts of a vessel which would normally be inspected during dry-docking inspection; (6)

   (c) state the essential checks on a vessel that should be made in EACH of the following situations:

   (i) before starting to re-flood the dock; (6)

   (ii) during the re-flooding of the dock. (2)

2. With reference to the maintenance of machinery on board a vessel:

   (a) explain why it is necessary to have some form of planned maintenance system in place; (4)

   (b) describe EACH of the following planned maintenance systems, stating an example for EACH:

   (i) Running hours; (4)

   (ii) Calendar intervals; (4)

   (iii) Condition monitoring. (4)

   (c) state FOUR circumstances or conditions that may require unscheduled maintenance. (4)

3. (a) Describe, with the aid of sketches, TWO types of portable fire extinguisher to be found on board a typical vessel. (12)

   (b) State the class of fire for which EACH of the TWO extinguishers described in (a) can be used. (6)

   (c) State how different fire extinguisher types may be identified. (2)

06-03

4. With reference to the International MARPOL Convention 73/78 Annex V - Garbage pollution:

   (a) state THREE catagories of garbage that are covered by this regulation, identifying which one of these catagories has a universl disposal prohibition into the sea; (4)

   (b) Annex V gives restrictions on the disposal of garbage within special areas:

      (i) list SIX special areas; (6)

      (ii) state the restrictions placed on the disposal of garbage within these areas. (10)

5. With reference to the Code of Safe Working Practices for Merchant Seamen:

   (a) define the term enclosed space, stating the particular hazards that may be present within such a space; (4)

   (b) list the precautions to be taken in EACH of the following situations:

      (i) before entering an enclosed space; (6)

      (ii) whilst working within the space; (6)

   (c) list TWO instruments commonly used for testing the atmosphere of an enclosed space, stating typical safe readings obtained from EACH instrument. (4)

05-03

CHIEF ENGINEER STATUTORY AND OPERATIONAL REQUIREMENTS

Attempt ALL questions

Marks for each question are shown in brackets

1. With reference to the maintenance of machinery on board a vessel:

   (a) describe EACH of the following planned maintenance systems, stating an example for EACH:

   (i) Running hours; (3)

   (ii) Calendar intervals; (3)

   (iii) Condition monitoring. (3)

   (b) state FOUR circumstances or conditions that may require unscheduled maintenance. (4)

   (c) describe how the Classification Society's requirements can be incorporated into a typical machinery maintenance system. (7)

2. (a) Describe, with the aid of sketches, THREE types of portable fire extinguisher to be found on board a typical vessel. (12)

   (b) State an application for EACH of the THREE extinguishers described in (a). (6)

   (c) State how different fire extinguisher types may be identified. (2)

3. (a) A vessel has no record of past fuel consumtion. The details for a forthcoming voyage are as follows:

Displacement	1500 tonnes
Range	2000 nautical miles
Speed	15 knots

   Given that the designer's fuel coefficient for the vessel is 52,000, calculate the bunker requirements.
   Note: An allowance of 15% fuel reserve should be made. (8)

   (b) State the actions to be taken, should it be found that, during the voyage, the actual fuel consumption is greater than the calculated consumption. (4)

   (c) Explain how to establish the requirements for fresh water for an extended voyage, assuming that part of the passage will take place through inshore waters. (8)

05-03

4. **The Code of Safe Working Practice for Merchant Seamen specifies that a Safety Committee must be formed on board.**

   (a) **State the FOUR people that have a legal right to sit on the committee.** **(4)**

   (b) **State SIX functions of the committee.** **(12)**

   (c) **Describe FOUR duties of a Safety Officer.** **(4)**

5. **With reference to the periodic dry-docking of a large motor yacht:**

   (a) **describe the preparation of the vessel prior to entering the dry-dock, listing the information that would be required to be passed on to the dry-docking contractors;** **(8)**

   (b) **describe how essential services are maintained on board the vessel during the docking period;** **(8)**

   (c) **list the checks that should be made prior to flooding the dock on completion of repairs.** **(4)**

03-03

CHIEF ENGINEER STATUTORY AND OPERATIONAL REQUIREMENTS

Attempt ALL questions

Marks for each question are shown in brackets

1. With reference to the Code of Safe Working Practices for Merchant Seamen:

   (a) define the term *enclosed space* stating the particular hazards that may be present within such a space; **(4)**

   (b) list the precautions to be taken in EACH of the following situations:

   (i) before entering an enclosed space; **(6)**

   (ii) while working within the space; **(6)**

   (c) state TWO instruments commonly used for testing the atmosphere of an enclosed space, stating typical *safe* readings obtained from EACH instrument. **(4)**

2. *(a)* The Maritime and Coastguard Agency (MCA) gives guidance to vessels by means of 'M' notes. State the THREE different types of 'M' notes, explaining the purpose of EACH type. **(6)**

   (b) Describe the role of the International Maritime Organisation (IMO) stating TWO examples of the conventions produced by this organisation. **(8)**

   (c) Describe how an IMO draft convention can be brought into force. **(6)**

3. With reference to the dry-docking of a large motor yacht:

   (a) describe the facilities available to maintain the essential services on board the vessel; **(8)**

   (b) list the inspections that are normally carried out in the presence of the Classification Society surveyor while the vessel is docked; **(6)**

   (c) describe the checks that must be carried out prior to and during the flooding of the dock on completion of repairs. **(6)**

4. *(a)* Describe, with the aid of a sketch, a typical machinery space CO_2 flooding system that uses a bank of separate CO_2 cylinders actuated by a pilot cylinder. **(14)**

   (b) List the precautions that must be taken before releasing CO_2 into the machinery spaces. **(6)**

5. *(a)* Explain why it is necessary for the machinery of a large motor yacht to be covered by some form of planned maintenance system. **(6)**

   (b) Describe the operation of a typical planned maintenance system. **(6)**

   (c) (i) Explain what is meant by the term *condition monitoring*. **(2)**

   (ii) State, with reasons, THREE examples of parameters that could be recorded for *condition monitoring*. **(6)**