Y4

Auxiliary Equipment and Basic Ship Construction

Example examination questions

AUXILIARY EQUIPMENT AND BASIC SHIP CONSTRUCTION February 2005

Attempt ALL questions

Marks for each question are shown in brackets

1. With reference to battery lockers:

   (a) state the requirements for an internal light fitting; (4)

   (b) explain why the requirements stated in Q1(a) are necessary. (6)

2. Describe the problems of using a 60Hz shore supply when a vessel has a normal frequency of 50Hz with reference to EACH of the following:

   (a) induction motors; (5)

   (b) fluorescent lighting. (5)

3. (a) Explain why a clutch/gearbox arrangement is used in a high-speed installation driving a controllable pitch propeller. (5)

   (b) State the conditions required for engaging the clutch in EACH of the following:

      (i) when the propeller shaft is stationary; (3)

      (ii) when connecting a second drive engine to a common gearbox. (2)

4. (a) State the factor that determines the minimum number of available generators required for a vessel to put to sea. (3)

   (b) State SEVEN essential services for the operation of a vessel. (7)

5. With reference to a centrifugal pump used for ballast/emergency bilge purposes:

   (a) explain the need for a priming device; (4)

   (b) describe TWO methods that may be used for priming the pump. (6)

6. Sketch an arrangement for the aft seal of an oil lubricated stern tube bearing. (10)

7. Describe TWO methods that can be used to reduce the rolling motion of a vessel. (10)

8. (a) State the purpose of fitting isolating valves in a ring fire main. (2)

   (b) State the type of valve that should be fitted for isolating sections of a ring fire main. (2)

   (c) Explain why the type of valve stated in Q8(b) is used. (3)

   (d) State how it is ensured that the isolating valve will operate when required. (1)

   (e) State the position of the machinery space isolating valve. (2)

9. With reference to the motion of a vessel, explain EACH of the following terms:

   (a) heaving; (2)

   (b) swaying; (2)

   (c) surging; (2)

   (d) pitching; (2)

   (e) yawing. (2)

10. State the purpose of EACH of the following:

   (a) hawse pipe; (2)

   (b) spurling pipe; (2)

   (c) chain locker; (2)

   (d) chain stopper; (2)

   (e) bitter end. (2)

AUXILIARY EQUIPMENT AND BASIC SHIP CONSTRUCTION **November 2004**

Attempt ALL questions

Marks for each question are shown in brackets

1. With reference to storage batteries:

   (a) explain how the level of charge can be determined in EACH of the following:

      (i) lead acid; (3)

      (ii) alkaline; (2)

   (b) state FIVE reasons that the charge may be reduced. (5)

2. With reference to shore supplies:

   (a) state THREE necessary checks before connecting to the vessel's distribution system; (3)

   (b) explain the possible consequences of connecting an incorrect shore supply. (7)

3. Describe the overload protection of an a.c. generator when EACH of the following occurs:

   (a) a serious fault causing a sudden high load; (3)

   (b) a large motor is started which causes a brief overload; (3)

   (c) the distribution load on the switchboard is increased. (4)

4. Describe a routine inspection of the reduction gearing and associated systems for a medium or high-speed propulsion diesel engine. (10)

5. A centrifugal bilge pump has not been operating satisfactorily, the air pump was tested and found to be operating correctly.

   List FIVE faults that could have caused the problem, stating why EACH fault causes poor operation. (10)

6. (a) State THREE advantages of modern water lubricated stern tube bearings compared with those that are oil lubricated. (3)

(b) State THREE disadvantages, explaining how EACH may be overcome. (7)

7. Describe the method of testing the steering gear before a vessel leaves port. (10)

8. (a) Sketch a flexible diaphragm valve. (6)

(b) Describe how the diaphragm is replaced, stating precautions to be taken. (4)

9. State how a structure is designed to resist the stress due to EACH of the following:

(a) main propulsion machinery; (3)

(b) discontinuities such as ends of superstructure; (2)

(c) openings in the deck; (3)

(d) connection of stays. (2)

10. Explain the meaning and purpose of EACH of the following terms:

(a) Flare; (2)

(b) Bulwark; (2)

(c) Coaming; (2)

(d) Freeing Port; (2)

(e) Scupper. (2)

Attempt ALL questions

Marks for each question are shown in brackets

1. With reference to lead acid batteries:

   (a) state the precautions necessary when preparing electrolyte from concentrated acid; (5)

   (b) describe the procedure that should be followed should the acid come into contact with EACH of the following;

      (i) surfaces in the work area; (2)

      (ii) skin or eyes. (3)

2. Describe TWO methods for detecting earth faults within a distribution system. (10)

3. (a) Sketch a lubricating oil system suitable for use with a reduction gearing, including the protective devices. (4)

   (b) State the purpose of EACH item in the system sketched in Q3(a). (6)

4. (a) Describe the operation of a preferential trip. (5)

   (b) State the type of circuits that can <u>not</u> be connected to the preferential trip, listing THREE examples. (5)

5. With reference to positive displacement pumps:

   (a) explain the need for a relief valve, stating where it would be fitted; (5)

   (b) explain when a pulsation damper may be fitted to the delivery line, stating how it works. (5)

6. (a) Explain how propeller thrust is transmitted to a vessel's hull. (3)

(b) Describe, with the aid of a sketch, the mounting arrangement of a thrust block to the hull. (4)

(c) Explain why the clearance between the thrust block pads and collar is critical. (3)

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

8. With reference to ship's side valves:

(a) state why grey cast iron is not a suitable material; (4)

(b) state, with reasons, TWO suitable materials. (6)

9. With reference to the hull of a vessel:

(a) define the term *fatigue;* (3)

(b) describe how fatigue stress occurs whilst in a seaway; (3)

(c) state the effect of fatigue on the hull material. (4)

10. With reference to a vessel's structure, explain the meaning of EACH of the following terms:

(a) beam; (2)

(b) frame; (2)

(c) girder; (2)

(d) beam knee; (2)

(e) stringer. (2)

03-04

AUXILIARY EQUIPMENT AND BASIC SHIP CONSTRUCTION

Attempt ALL questions

Marks for each question are shown in brackets

1. (a) Explain the term *short circuit.* (2)

   (b) State the dangers of a *short circuit.* (3)

   (c) State the device that is fitted to motor circuits to protect against short circuits. (2)

   (d) Explain how the device stated in Q1(c) operates. (3)

2. Describe the routine maintenance, including safety precautions, for a vessel's storage batteries. (10)

3. (a) Sketch a pneumatically operated friction clutch, labelling ALL parts. (7)

   (b) State how the clutch may be operated in the event of air failure. (3)

4. With reference to a main circuit breaker which has been inadvertently covered with seawater while not in service:

   (a) state the dangers of operating the circuit breaker; (4)

   (b) explain how you would return the breaker to a usable condition. (6)

5. (a) State SIX advantages of controllable pitch propellers. (6)

   (b) State FOUR disadvantages of controllable pitch propellers. (4)

6. With reference to centrifugal pumps used for bilge/ballast purposes:

   (a) explain the problems which may arise using the pumps for these purposes; (4)

   (b) explain TWO methods used to improve pump performance when used for these purposes. (6)

03-04

7. Sketch a hydraulic system for adjusting the angle of fin stabilisers, labelling ALL parts. (10)

8. Sketch a cross-section through a valve suitable for use as an isolating valve in a fire main, labelling ALL parts and stating a suitable material for EACH part. (10)

9. With reference to a vessel's hull:

   (a) state the meaning of the term *racking*; (2)

   (b) explain how *racking* occurs; (4)

   (c) state the structures that resist *racking*. (4)

10. Describe the functions of a watertight bulkhead. (10)

01-04

AUXILIARY EQUIPMENT AND BASIC SHIP CONSTRUCTION

Attempt ALL questions

Marks for each question are shown in brackets

1. With reference to a.c. generators:

   (a) explain why they must be synchronised before connecting in parallel; (6)

   (b) list TWO devices for ensuring that synchronising is correct; (2)

   (c) state how the devices listed in Q1(b) indicate that synchronising is correct. (2)

2. State, with reasons, FIVE advantages of Valve Regulated Lead Acid Batteries. (10)

3. (a) Sketch a flexible coupling that could be used for a main propulsion drive. (7)

   (b) State THREE reasons for using a flexible coupling in propulsion drives. (3)

4. Describe the routine maintenance that should be carried out on an a.c. generator. (10)

5. With reference to stern bearings, state the advantages and disadvantages of using EACH of the following:

   (a) white metal; (5)

   (b) plastic. (5)

6. Describe, with the aid of a sketch, the operation of a gear pump. (10)

7. With reference to steering gears:

(a) state the angular movement required; (2)

(b) explain, with the aid of a sketch, how the movement stated in Q7(a) is ensured in the design of EACH of the following:

(i) a *piston* type gear; (4)

(ii) a *rotary vane* type gear. (4)

8. (a) State THREE reasons that may cause a relief valve to lift in service. (3)

(b) State THREE reasons that may cause a relief valve to fail to lift should excessive pressure occur. (3)

(c) Explain how the correct operation of a relief valve is ensured. (4)

9. (a) Explain the meaning of EACH of the following:

(i) camber; (2)

(ii) sheer. (2)

(b) Explain how EACH of the following improves seaworthiness:

(i) camber; (3)

(ii) sheer. (3)

10. Describe, with reasons, the features of watertight doors fitted to the weather deck. (10)

11-03

AUXILIARY EQUIPMENT AND BASIC SHIP CONSTRUCTION

Attempt ALL questions

Marks for each question are shown in brackets

1. (a) Using Worksheet Q1, sketch how an a.c. motor would be connected in EACH of the following:

   (i) Star; (3)

   (ii) Delta. (3)

   (b) State the probable consequences of connecting a motor in *star* instead of *delta*. (4)

2. Describe, with the aid of a sketch, an arrangement for lead-acid batteries that maintains the batteries in a ready state and enables automatic connection to emergency supplies in the event of power failure. (10)

3. Explain why main reduction gearing uses oil sprayers for lubrication rather than rely on a wet sump and the gearing picking up oil as it rotates. (10)

4. Describe, with the aid of sketches, the features of a main circuit breaker that minimise contact damage when tripping on excessive current. (10)

5. Describe the inspection of a main thrust bearing. (10)

6. (a) Sketch a vane type pump suitable for use as a priming pump, labelling all components. (6)

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

7. With reference to vane stabilisers, describe, with the aid of sketches, EACH of the following:

   (a) how dynamic stabilisation occurs; (5)

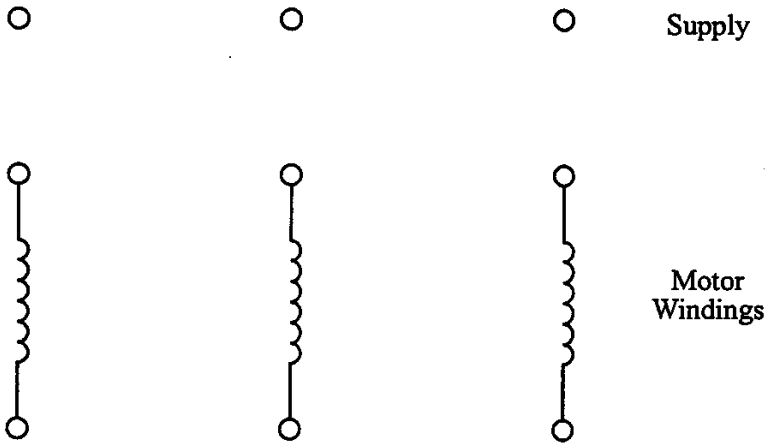
   (b) how passive stabilisation is achieved. (5)

11-03

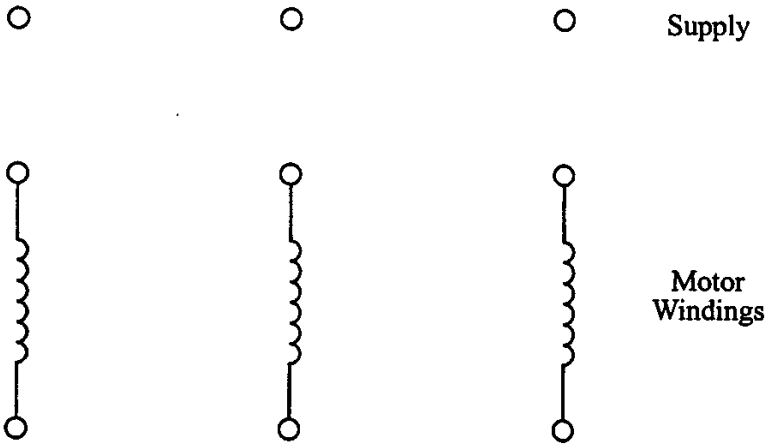
056-01 AUXILIARY EQUIPMENT & BASIC SHIP CONSTRUCTION **WORKSHEET Q1** **7 NOVEMBER 2003**

(This Worksheet must be returned with your answer book)

(i)



(ii)



8. Sketch a typical bilge system for a machinery space of a yacht of more than 400 grt. (10)

9. Explain the meaning of EACH of the following terms:

   (a) LOA; (2)

   (b) displacement; (2)

   (c) load line; (2)

   (d) draught; (2)

   (e) beam. (2)

10. State the advantages and disadvantages of FRP (Fibre Reinforced Plastic) as a yacht hull material. (10)

04-03

AUXILIARY EQUIPMENT AND BASIC SHIP CONSTRUCTION

Attempt ALL questions

Marks for each question are shown in brackets

1. (a) State THREE factors that determine the rotating speed of a single-phase motor in service. (3)

   (b) State the meaning of the term *slip*. (2)

   (c) Explain why an induction motor requires slip. (5)

2. With reference to a vessel having both alkaline and lead-acid batteries installed:

   (a) describe the special precautions necessary, stating reasons for these precautions; (8)

   (b) state TWO advantages of alkaline batteries. (2)

3. Describe a routine inspection of the reduction gearing and associated systems for a medium or high-speed propulsion diesel engine. (10)

4. Describe the overload protection of an a.c. generator when EACH of the following occurs:

   (a) a serious fault causing a sudden high load; (3)

   (b) a large motor is started which causes a brief overload; (3)

   (c) the distribution load on the switchboard is increased. (4)

5. A centrifugal **bilge** pump has not been operating satisfactorily – the air pump was tested and found to be operating correctly.

   List FIVE faults that could have caused the problem, stating why EACH fault causes poor operation. (10)

6. (a) Sketch a typical thrust pad for a reversing propulsion drive, showing the direction of rotation. (4)

   (b) State how the pads differ in a thrust block of a reversing drive from those used with a unidirectional drive. (2)

   (c) Explain why this difference is required. (4)

7. Explain, with the aid of sketches, how fin stabilisers reduce the rolling motion of a vessel (10)

8. (a) Sketch a flexible diaphragm valve. (6)

   (b) Describe how the diaphragm is replaced, stating the precautions that should be taken. (4)

9. With reference to a vessel's hull:

   (a) explain the meaning of EACH of the following:

   (i) dynamic stress; (3)

   (ii) static stress; (3)

   (b) state TWO examples of EACH type of stress explained in Q9(a). (4)

10. With reference to vessel construction:

   (a) state TWO advantages and TWO disadvantages of aluminium when compared to steel; (4)

   (b) sketch a bolted joint between a steel and aluminium structure, stating why this arrangement is required. (6)

02-03

AUXILIARY EQUIPMENT AND BASIC SHIP CONSTRUCTION

Attempt ALL questions

Marks for each question are shown in brackets

1. *(a)* Explain the term *single phasing*. **(2)**

   (b) State the effects on a motor of *single phasing*. **(6)**

   (c) State how *single phasing* may be protected against in the motor starter circuit. **(2)**

2. *(a)* State the safety precautions required when working on storage batteries. **(6)**

   (b) Describe the actions to be taken should electrolyte inadvertently come into contact with eyes or skin. **(4)**

3. With reference to reduction gearing:

   (a) explain the significance of the magnetic filter in the lubricating oil system; **(3)**

   (b) explain why the surface finish of the gear teeth is important; **(4)**

   (a) state why a flexible coupling is fitted between engine and gearbox. **(3)**

4. With reference to a 3-phase generator being contaminated with seawater:

   (a) state the dangers of running the generator; **(2)**

   (b) describe the procedure to restore the generator to a usable condition while at sea. **(8)**

5. With reference to a centrifugal sea water pump fitted above the water line:

   (a) state, with reasons, why its performance may deteriorate in service; **(6)**

   (b) explain how the problems stated in Q5*(a)* may be overcome. **(4)**

6. A thrust block can be either independently mounted or incorporated into the main machinery.

   (a) Explain how the propellor thrust is transmitted to the vessel's hull. **(3)**

   (b) Describe, with the aid of a sketch, the mounting arrangement of the thrust block to the hull. **(4)**

   (c) Explain why the clearance between the pads and collar is critical. **(3)**

02-03

7. *(a)* Sketch the arrangement of a two ram, variable displacement pump, hydraulic steering gear showing the telemotor, tiller, pump and hunting gear. **(6)**

   (b) Explain the function of the hunting gear sketched in Q7*(a)*. **(4)**

8. Sketch a cross section of a bilge suction valve, labelling the parts and stating a suitable material for EACH part. **(10)**

9. *(a)* Describe, with the aid of a sketch, how stress varies around the section of a hull due to water pressure when floating in still water. **(5)**

   (b) Explain how the hull is constructed to resist this stress. **(5)**

10. Describe the inspection of the underwater area of a vessel while in dry-dock. **(10)**

01-03

AUXILIARY EQUIPMENT AND BASIC SHIP CONSTRUCTION

Attempt ALL questions

Marks for each question are shown in brackets

1. With reference to main distribution switchboards being fitted with preference trips:

   (a) state why the preference trip is fitted; **(2)**

   (b) explain the operation of a two-stage preference trip; **(6)**

   (c) state what determines the circuits that are connected to the preference trip. **(2)**

2. *(a)* Describe the sequence of manually starting and paralleling two identical A.C. generators using a synchroscope. **(8)**

   (b) State the reason for not connecting when the synchroscope is at 12 o'clock. **(2)**

3. *(a)* Sketch a cross section through a valve suitable for protecting a starting air receiver against overpressure. **(6)**

   (b) Explain how you would set the valve sketched in Q3(a) after overhaul. **(4)**

4. *(a)* Sketch a purely passive stabilising tank system. **(6)**

   (b) Explain how the system sketched in Q4(a) reduces the vessel's rolling motion. **(4)**

5. *(a)* State the function of the thrust block. **(3)**

   (b) Sketch a typical thrust pad for a unidirectional engine, showing the direction of rotation. **(4)**

   (c) State the difference between ahead and astern pads of a unidirectional engine with CPP, explaining why this difference is required. **(3)**

6. *(a)* Sketch a mid-entry twin screw pump, showing the direction of fluid flow through the pump. **(8)**

   (b) Explain why mid-entry is used. **(1)**

   (c) State a shipboard use for this type of pump. **(1)**

7. *(a)* Explain why a clutch/gearbox arrangement is used in a high-speed installation driving a CPP. **(4)**

   (b) State the conditions required for connecting the engine to the gearbox. **(6)**

8. *(a)* Describe the hazards with regard to the maintenance and charging of vented alkaline batteries. **(6)**

   (b) State the treatment necessary for the accidental splashing of the contents of an alkaline battery onto the skin and in the eyes. **(4)**

9. *(a)* Explain EACH of the following:

   (i) hogging; **(2)**
   (ii) sagging. **(2)**

   (b) Describe, with the aid of a sketch, the structure to resist these stresses. **(6)**

10. With reference to fuel tanks, describe the features and purpose of EACH of the following:

    (a) *air* pipes; **(5)**

    (b) *sounding* pipes. **(5)**

11-02

AUXILIARY EQUIPMENT AND BASIC SHIP CONSTRUCTION

Attempt ALL questions

Marks for each question are shown in brackets

1. A new 3-phase 440V a.c. motor is received with the terminal arrangement as shown on Worksheet Q1.

   (a) Using Worksheet Q1 sketch the motor connected in EACH of the following:

   (i) STAR operation; (3)
   (ii) DELTA operation. (3)

   (b) State TWO electrical tests that should be carried out before using the motor. (2)

   (c) State how the direction may be reversed, if the direction of rotation is incorrect. (2)

2. *(a)* List FIVE devices fitted to a main distribution switchboard in order to protect a.c. generators that can be operated in parallel. (5)

   (b) Explain why EACH device listed in Q2(a) is needed. (5)

3. *(a)* State why grey cast iron is NOT a suitable material for ships side valves. (2)

   (b) State, with reasons, TWO suitable alternative materials. (4)

   (c) State the regular maintenance that ship side valves should receive, outlining reasons for this maintenance. (4)

4. *(a)* State the purpose of the hunting gear fitted to a steering gear system. (2)

   (b) Explain, with the aid of sketches, the action of a hunting gear fitted to a hydraulic- hydraulic steering gear. (8)

5. Sketch a bellows type stern tube seal. (10)

6. With reference to centrifugal sea water pumps:

   (a) explain why they are invariably situated below the water line; (2)

   (b) explain why they need more maintenance than fresh water pumps; (4)

   (c) state four possible reasons for the pump temperature to be excessively high. (4)

7. With reference to the inspection of main propulsion gearing, explain the cause of EACH of the following types of wear, stating the appearance of the gear that indicates that wear is occurring:

   (a) scuffing; (3)

   (b) pitting; (4)

   (c) abrasion. (3)

8. *(a)* Explain how the level of charge may be determined in EACH of the following:

   (i) a lead-acid battery; (2)
   (ii) an alkaline battery of the non-sealed type. (2)

   (b) Explain why the electrolyte level in both types of battery falls during service, outlining the dangers this poses. (6)

9. With reference to the motion of a vessel, explain EACH of the following terms:

   (a) heaving; (2)

   (b) swaying; (2)

   (c) surging; (2)

   (d) pitching; (2)

   (e) yawing. (2)

10. *(a)* Sketch a cross section through a manhole with doubler. (6)

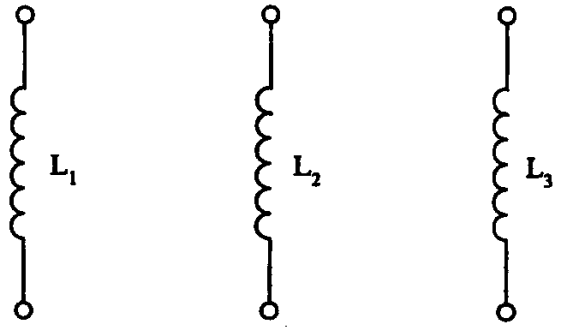
    (b) Explain the advantages of this method compared to bolting the cover direct to the tank top. (4)

11-02

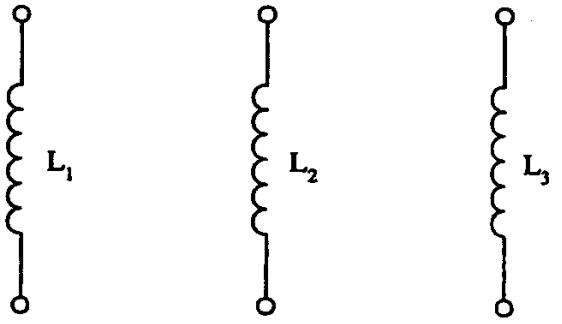
AUXILIARY EQUIPMENT AND BASIC SHIP CONSTRUCTION

WORKSHEET Q1
(NB This Worksheet must be returned with your answer book)

(a)(i)



(a)(ii)



06-02

AUXILIARY EQUIPMENT AND BASIC SHIP CONSTRUCTION

Attempt ALL questions

Marks for each question are shown in brackets

1. The Earth Fault lamps of a 3-phase distribution system are illuminated in the following manner:

Red phase	Bright
Yellow phase	Dim
Blue phase	Out

(a) State the fault condition. (3)

(b) Explain how you would discover the fault location. (7)

2. *(a)* State the requirements that determine the required generating capacity of a vessel. (4)

(b) Explain the sequence for restoring electrical power, should the generator in use fail. (6)

3. *(a)* State, with reasons, the type of valve that should be fitted to EACH of the following:

(i) Bilge Suction; (2)
(ii) Ships Side Sea Suction; (2)
(iii) Fire Hydrant. (2)

(b) State the information required to order a replacement valve. (4)

4. With reference to Electro-hydraulic steering systems:

(a) state the alarms fitted; (4)

(b) explain why relief valves are fitted; (4)

(c) state where relief valves are fitted. (2)

5. With reference to roller bearings being used as propeller shaft bearings, their races must be split in order to allow replacement:

   (a) explain, with the aid of sketches, EACH of the following:

      (i) the problems that this can cause; (2)
      (ii) how roller bearings accommodate the alignment problems of a flexible hull. (6)

   (b) explain why the correct amount of lubrication must be used. (2)

6. *(a)* Sketch a cross section through a vertical single stage, single entry centrifugal pump, labelling the components. (6)

   (b) Explain why wear ring clearances must be maintained within limits. (4)

7. *(a)* Sketch a flexible coupling that could be used for a main propulsion drive. (7)

   (b) State THREE reasons for using a flexible coupling in a propulsion drive. (3)

8. Describe, with the aid of a sketch, an arrangement for lead-acid batteries that maintains the batteries in a ready state and enables automatic connection to emergency supplies in the event of a power failure. (10)

9. Explain the meaning of EACH of the following terms:

   (a) freeboard; (3)

   (b) displacement; (2)

   (c) load line; (2)

   (d) draught; (2)

   (e) trim. (1)

10. State the advantages and disadvantages of aluminium as a yacht hull material. (10)

05-02

AUXILIARY EQUIPMENT AND BASIC SHIP CONSTRUCTION

Attempt ALL questions

Marks for each question are shown in brackets

1 *(a)* Describe the routine maintenance required on storage batteries. (7)

(b) State THREE requirements for the construction of a battery locker. (3)

2 *(a)* Explain the term *single phasing.* (2)

(b) If a motor has been single phased state what will happen if:

(i) the motor is stopped and an attempt is made to start; (3)
(ii) the motor is already running when single phasing occurs. (3)

(c) State how single phasing can be detected by protection equipment. (2)

3 *(a)* Sketch a lubricating oil system suitable for use with a reduction gearing, showing the safety devices present. (4)

(b) State the purpose of EACH component of the system sketched in Q3(a). (6)

4 A 3-phase generator has been inadvertently contaminated with seawater while stopped.

(a) State the dangers of running the generator after contamination. (2)

(b) Explain how you would attempt to restore the generator to a useable condition. (8)

5 *(a)* Sketch a cross section through a gear pump, clearly showing the passage of fluid from suction to discharge. (7)

(b) State, giving reasons, a suitable use for this type of pump. (3)

6 *(a)* State the purpose of the stern tube seals of an oil-lubricated bearing. (2)

(b) Sketch the arrangement of an aft sterntube seal of the Lips type. (8)

05-02

7 Worksheet Q7 shows a two ram steering gear.

(a) Using Worksheet Q7, sketch a block diagram of a valve controlled hydraulic circuit. (5)

(b) Explain the purpose of EACH component of the diagram sketched in Q7(a). (5)

8 *(a)* Sketch a screw lift valve suitable for seawater service. (7)

(b) State, with reasons, the materials to be used in the manufacture of the screw lift valvein Q8(a). (3)

9 *(a)* Describe, with the aid of a sketch, how stress varies around the section of hull due to water pressure when floating in still water. (5)

(b) State the structure that resists the stress described in Q9(a). (5)

10 Fig. Q10 shows a midship section of a motor yacht.

(a) Name the items of structure labelled *a, b, c, d and e.* (5)

(b) State the terms used to describe the connection of deck to shell, *f*, and side to bottom shell, *g*. (2)

(c) In Fig Q10, *h* shows a tripping bracket attached to a girder. Explain the purpose of the tripping bracket. (3)

05-02

**AUXILIARY EQUIPMENT AND
BASIC SHIP CONSTRUCTION**

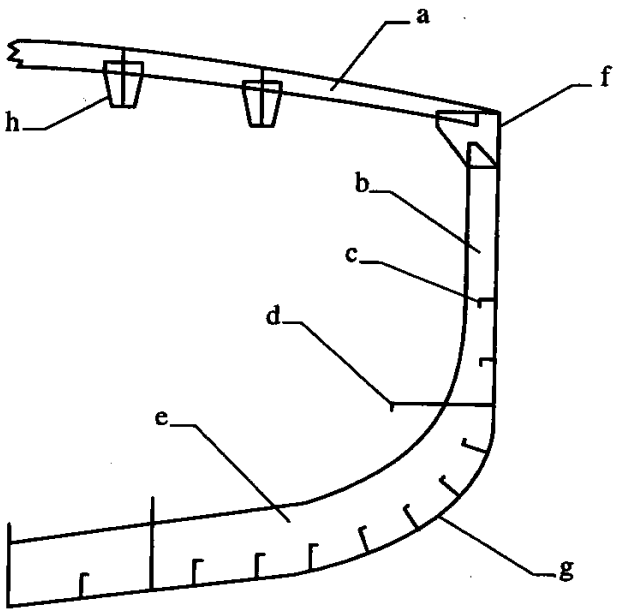


Fig. Q10

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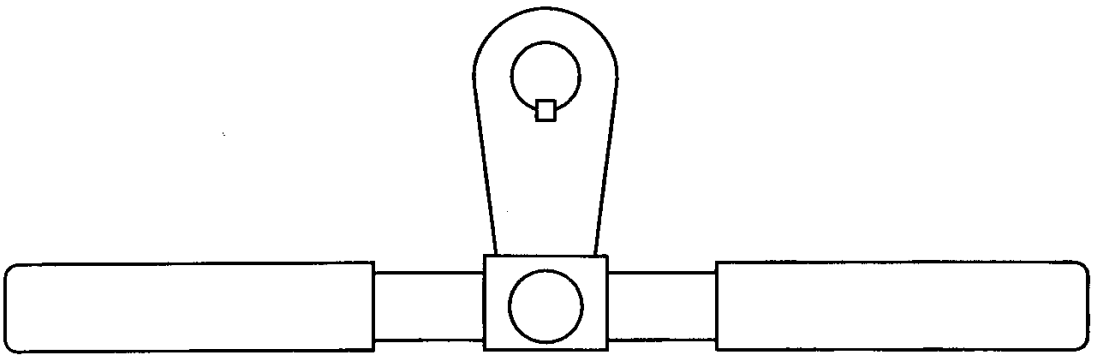
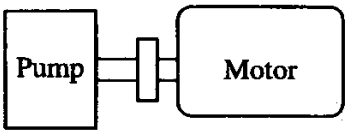
AUXILIARY EQUIPMENT AND
BASIC SHIP CONSTRUCTION

WORKSHEET Q7
(NB This worksheet must be returned with your answer book)





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AUXILIARY EQUIPMENT AND BASIC SHIP CONSTRUCTION

Attempt ALL questions

Marks for each question are shown in brackets

1 State FIVE causes of earth faults, explaining how they can be prevented. (10)

2 *(a)* State what type of light fitting should be installed in a battery locker. (2)

(b) State why this type of fitting is required. (2)

(c) List SIX other safety precautions which should be observed when maintaining batteries. (6)

3 *(a)* Sketch a pneumatically operated clutch suitable for use with reduction gearing. (7)

(b) State how the clutch may be operated in the event of operating air failure. (3)

4 *(a)* State the requirements for connecting a 3-phase generator to live busbars. (3)

(b) Sketch a connection diagram for synchronising lamps, stating when synchronisation should occur. (5)

(c) State what occurs if synchronising is incorrect when connecting to the busbars. (1)

(d) State the possible consequence of incorrect synchronising. (1)

5 *(a)* Sketch a section through a hydraulic sleeve type shaft coupling, stating suitable materials for the inner and outer sleeves. (4)

(b) State how torque is transmitted. (2)

(c) Explain how the coupling is assembled. (4)

6 With reference to a centrifugal pump used for ballast/emergency bilge purposes:

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

(b) explain the purpose of the wear rings, outlining why the clearance is critical; (5)

(c) explain the need for a priming device; (1)

(d) state TWO methods of priming centrifugal pumps. (2)

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7 *(a)* Describe the pre-sailing checks that should be carried out on a steering gear. (9)

(b) State the frequency of the testing of emergency steering gear. (1)

8 *(a)* Sketch an automatic reducing valve that will maintain air supply at a constant pressure. (6)

(b) Explain how discharge pressure is maintained constant. (4)

9 The transverse section of a vessel may be subjected to racking stress.

(a) Explain, with the aid of sketches, how this may occur. (5)

(b) State the structure that resists this stress, giving specific examples. (5)

10 Describe the functions of a double bottom. (10)