# CERTIFICATES OF COMPETENCY FOR ENGINEERS (YACHT)

EXAMINATIONS ADMINISTERED BY THE
**SCOTTISH QUALIFICATIONS AUTHORITY**
ON BEHALF OF THE
**MARITIME AND COASTGUARD AGENCY**

**STCW 95 CHIEF ENGINEER (REG. III/3) – "YACHT 4"**

**056-02 AUXILIARY EQUIPMENT**

**FRIDAY, 25 APRIL 2008**

**1400 - 1600 hrs**

Examination paper inserts:

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Notes for the guidance of candidates:

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| 1. Non-programmable calculators may be used.<br><br>2. All formulae used must be stated and the method of working and ALL intermediate steps must be made clear in the answer. |

Materials to be supplied by colleges:

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| Candidate's examination workbook |

**Marks for each question are shown in brackets**

1 (a) Sketch a section through a bilge injection (emergency bilge) valve. (6)

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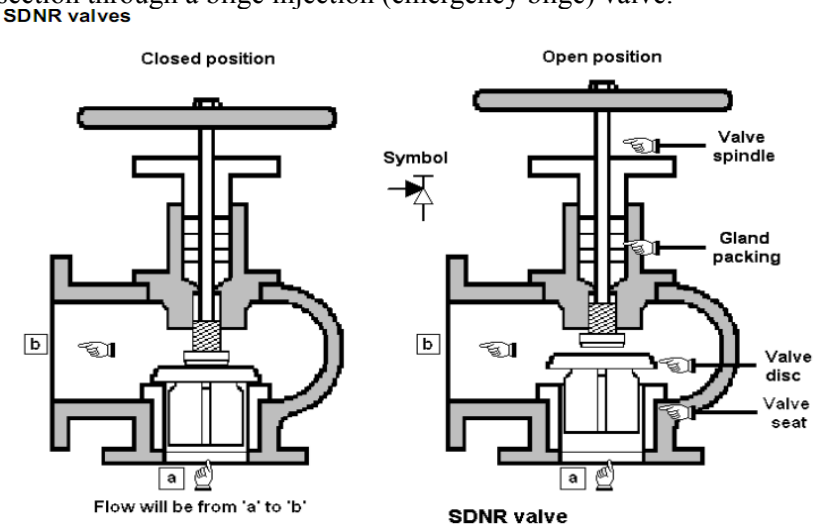


(4)

(b) Describe how the valve sketched in Q1(a) is tested.

Operate up and down once a week to make sure it's working in a correct order. Every dry dock valve should be taken out and inspected.

2 (a) Sketch a section through a single stage centrifugal pump. (7)

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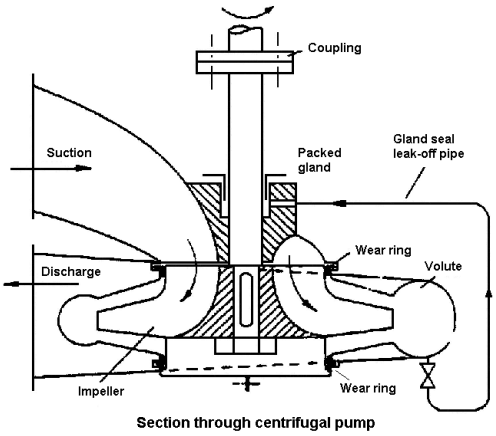
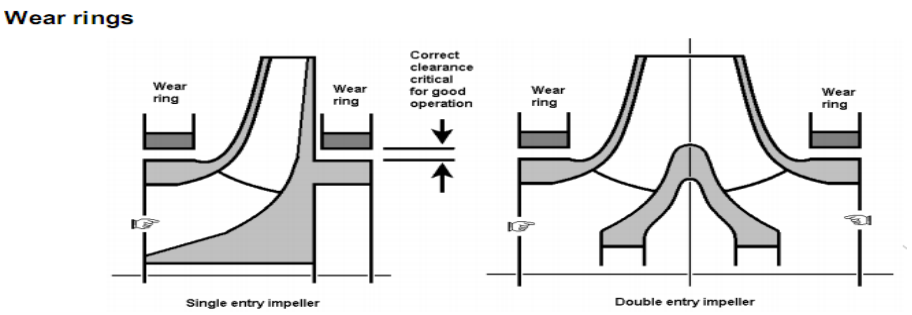



(3)




(b) Indicate on the sketch of Q2(a) the critical clearances, stating why these clearances are critical. as the wear rings wear, the clearances increase this leads to poor proformance

3 With reference to an air supply for pneumatic control systems:

.

(a) state THREE contaminants that may be present (3)

oil – this contaminant is introduced to the system if the rings of the compressor are worn. (7)

water ,

solid particles,

Water dosen't compress – corrison will ruin the inside of the lines and receivers. Can damage your tools.Cause blockage , Oil can be flammable when it mists up.

Oil Dosen't compress – Particulates (like paint) can block up the system. Water can cause rust and corrosion and can erode the surfaces of the control system.

4 With reference to a reduction gearing and pneumatic clutch arrangement:

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(a) state FIVE protection devices fitted; (5)

(b) Oil Pressure

(c) Oil Temperature (5)

(d) Oil Level

(e) Air Pressure

In gear inter lock with the main engine

(f) explain the need for EACH device stated in Q4(a).

Oil Pressure, an inter lock between the gearbox and engine powered by compressed air is so the clutch plates won't in gauge without suitable oil pressure. Lack of lubricate pressure can cause slippage of the gears, which can wear the clutches

Oil Temp: High oil temps can indicate high bearing temperatures, which can indicate a problem arising soon.

Oil Level: The level of the oil must be monitored and maintained at the proper level. Too low of oil can cause high running temperatures, too much oil can cause excessive splash lubrication and foaming of the oil.

5. Fig Q5 shows a diagram of a hydraulic system that could be used to operate a sliding door.

Describe the operation when the manual valve is moved to EACH of the following:

(a) the *straight through* position; (4)

(b) The *cross-over* position. (6)

Fig Q5

6. Describe TWO reasons, other than imbalance, for propeller induced vibration. (10)

Cavitation, water boils at low pressure causing small air bubbles, these bubbles expaind and colasp cause pitting. Pitting causes damage to the propeller and vibrating.

Pitching, from the vessel pitching, the stern rise's up out of the water causing a reducing of the load on the propeller and off the engine, causing the engine to run faster then dropping back into the water slowing the engine down .

7.

(7)

With reference to intermediate shaft bearings of the plain bearing type:

(3)

describe the hydrodynamic lubrication that occurs when the shaft is rotating; Is determined by the peripheral speed of the shaft, the viscosity of the oil and the load on the shaft. The oil is carried by an oil wedge.

(b) explain the importance of lubricating oil temperature.

The most important factor is optimum oil viscosity. If the oil viscosity is too low, it will be too thick and not flow. If the viscosity is too high, oil will not create the proper lubricating wedge. The manufacture will have a recommended operating temp and oil grade, following these recs ishighly important for correct operating conditions.

8. Outline the necessary precautions, as stated in COSWOP, for working near live electrical equipment, when it is essential for the safety of the ship or for testing purposes. (10)

- **Permit to work**
- **Risk Assessment**
- **PPOE (Personal Protective Operating Equipment)**
- **Fuses removed an breakers open and locked out.**
- **A 2nd watch man, make sure he understandings how to shutdown the system and is able to carry out first aid.**
- **Follow all safety percoritions.**

- Exposure of the dangerous part must be the minimum necessary
- A responsible ships officer or other person must authorize the exposure
- Only a competent person may carry out the procedure

- Any person working close to the machinery must have enough clear space and adequate light while they are working
- Any person operating or close to the machinery must have adequate instruction in safe systems of work for that machinery, the dangers rising from it's operation and the precautions to be taken
- And
- A conspicuous warning must be placed on or close to the machinery

All ship's electrical equipment and installations must be constructed, installed, operated and maintained in such a way that there is no electrical hazard to the ship or any person

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

Frequency = (Number of Revs) (Number of Poles)

(2)

(c) State the meaning of the term *slip*

(5)

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

An induction motor requires slip because lines of flux must be cut in order to create a magnetic field in the rotor. The 'created' magnetic field in the rotor opposes the syncronsis magnetic field of the stator. These two opposing/attracting fields cause the rotor to spin.

10. With reference to AVRs:

(a) explain their purpose; (4)

The AVR stands for Automatic Voltage Regulator. Atuomaticaly adjusts the output voltage on a generator Aids in the parreling of 2 generators by syincing together.

(b) explain the effects that would be observed should an AVR give a low output when the generator is: the voltage will lower and not come back up, and on the next load added the generator will dip again due to load.

(i) running on its own; (2)

Voltage droop would be high. The length of time that for the voltage to return to 100% would lengthen. Usually a faulty AVR will also have a returned voltage slightly less than what is desired. (4)

(ii) running in parallel with a second generator whose AVR has no fault.

Voltage regulation the generator that has a good AVR will take up the load from the other generator in an event to equal parrel.