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"

057-02 OPERATIONAL PROCEDURES, BASIC HOTEL SERVICES AND SHIP CONSTRUCTION

FRIDAY, 24 OCTOBER 2008

1400 - 1600 hrs

Examination paper inserts:

Notes for the guidance of candidates:

1. Non-programmable calculators may be used. 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 examination centres

Candidate's examination workbook

OPERATIONAL PROCEDURES AND BASIC HOTEL SERVICES

Attempt ALL questions

Marks for each question are shown in brackets

1. (a) With reference to STCW:

(i) state what the letters STCW represent; (1)

Standards of Training, Certification and Watchkeeping

(ii) state the meaning of the term *Whitelist*. (4)

The White List is a list of countries that are properly implementing the most recent STCW Conventions.

(b) With reference to hours of work and rest:

(1)

(i) state the organisation which governs the UK requirements;

Health and Safety Executive (4)

(ii) state the minimum rest periods for a watchkeeper under normal conditions.

Minimum is 6 hours uninterrupted sleep in a 24hour period

2. (a) With reference to the record of defects, list FIVE parameters which can give guidance for future maintenance planning and dry dockings. (5)

Meghometers for insulation

Hour meters on engines (5)

Engine trending

Main Engine Performance Data

Differential pressures on aftercoolers

Megera readings

Lube oil tests anyless and tests

(b) State FIVE details listed in a machinery abstract asoisiated with and relating to a main engine.

1. Main Engine Runnin Hours
2. Peak pressures
3. Jacket Water sample data
4. Lube Oil anyless
5. Peak Pressures for Main Engine
6. Lube oil sampling

3. With reference to chlorofluorocarbon (CFC) and hydrochlorofluorocarbon (HCFC) refrigerant gases:

(a) explain the difference between the two types of gases; (3)

CFC are more dangerous to the environment due to the free radical Chlorine that is released when broken apart by UV radiation in the atmosphere. The UV radiation also (1)
breaks apart the ozone, which ends up in a free radical oxygen floating around. The Chlorine atom easily binds with the oxygen, which ends up in the reduction of
available oxygen atoms for recombination to form ozone. (1)

HCFC do not give up a free Chlorine atom as easily, so when they are broken apart by (2)
UV radiation, they do not 'consume' the solo Oxygen atoms.

(b) state the Marpol Annex number which prohibits their deliberate emission; (3)

IAPP 6

(c) state the name of the environmental treaty under which nations agreed to cut consumption and production of chlorofluorocarbons;

Montreal Protocol signed in Sept 16, 1987

(d) explain why deliberate emissions are prohibited;

Depletion of the ozone is a hazard to the health of the worlds environment

(e) explain how deliberate emissions are prevented when removing air from a refrigeration system.

The only proper way to remove air (atmosphere) from a refrigeration system is to recover the refrigerant using a gas recovery machine. The contaminated gas is then recycled at an appropriate location. The system can be charged with Nitrogen to ensure that all atmosphere has been removed from the system, as well as allowing for leak testing to be conducted more efficiently. Once the system has been proven to be secure and leak free, the system is brought down to a vacuum by the use of a vacuum machine. (Nitrogen can be released into the atmosphere, as it posses no environmental threat.) With the system in a vacuum, a proper charge of refrigerant gas can be loaded, atmosphere free.

4. With reference to fuel oil bunkering, storage and transfer, explain EACH of the following:

(a) what is meant by free surface effect in a partially filled tank and why it can be dangerous; (4)

The centre of gravity of a partially filled tank will alter the ships stability and can cause serious safety concerns. (3)

(b) why filling a tank completely full so that the fuel rises up the sounding pipe is inadvisable; (3)

This will end up in a head pressure on the tank and it can overstress the tank. This can cause the tank to rupture. Filling a tank full does not leave any room for expansion

(c) why an empty tank should be opened before a tank that is being filled is shut off.

To keep from over pressurizing the fuel line.

5. With reference to sewage treatment plants:

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

- Black water is from any toilet and any waste liquid discharge from the hospital goes into the black water. (3)
- Grey Water is waste water from any other source. Generally it includes sink disposal, laundry drains, air conditioning condensate, galley sinks and showers. (3)

(2)

In some systems, depending on local regulations, these systems can be treated as one system, with the

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

Aerobic micro organisms needs oxygen

Anaerobic organisms do not need oxygen

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

Methane

Hydrogen Sulfide

Ammonia

(d) explain the dangers of producing the gases listed in Q5(c) in a confined space.
Methane= explosive
Hydrogen Sulfide= is very toxic like Ammonia
Hydrogen Sulfide= corrosive

6. With reference to air conditioning systems:

(a) sketch a section through an Air Handling Unit; (5)

(b) state the safety regulations when an air trunking passes through a bulkhead and the safety devices fitted. (5)
Has to have a fire damper with a fusible link and be able to be closed manually. The damper system should also be well insulated from fire

7. Explain the action to be taken by the watchkeeping engineer in the event of EACH of the following:

(a) fire; (6)
- Raise the alarm
- Inform the bridge not a drill (4)
- Attempt to be made to extinguish the fire by appropriate means
- Ventilation should be reduced, and adjacent materials removed to abate the spread of the fire
- If space is filling with noxious fumes, all personal not equipped with breathing apparatus should vacate the area.
- Once the fire is extinguished, caution should be taken against it re-igniting.
- Personal should not re-enter the space without breathing apparatus until the space is well ventiliated

(b) grounding.
Enter in log book
Call bridge with notice of bump felt
Call extra hands
Survey entire ship for signs of leaks inboard and outboard
All tank levels logged
Observe overboard waters for signs of oil leaks
Engine Room surveyed for any abnormalities. Engine is hot, shafts bent, seals leaking
Discussion with master regarding what has happened
Machinery surveys need to be carried out
Surveys of ship inside/out should be done within another hour, and regular intervals within first 24 hours
A set of crank shaft deflections should be carried out at the earless possible time.

8. Describe, with the aid of a sketch, a vacuum distillation plant. (10)

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9. (a) Explain the SIX different classes of fire. (6)

A-Combustibles
B-Boiling Liquids (3)
C-Boiling Gasses
D-Metals
E-Electrical (1)
F-Fats/Oils

(b) List the THREE primary extinguishing methods.

Removing Oxygen
Breaking Chemical Reaction
Cooling

(c) State the danger associated with using large amounts of water to extinguish a fire on board ship.

Changes the stability of the vessel

10. With reference to the materials used in the construction of hulls:

(a) state FIVE advantages of using fibre reinforced plastic (FRP); (5)

No dissimilar metal issues
Lightweight (2)
Raw materials are inexpensive
Low skilled workforce (3)
High strength to weight ratio
Doesn't have to be painted

(b) state TWO advantages of using aluminium;

Light weight
It's easy to work with

(c) state THREE advantages of using steel.

Low cost of purchase
Low cost of production
Easily available world wide