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, 23 JANUARY 2009

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 colleges:

Candidate's examination workbook

AUXILIARY EQUIPMENT

Attempt ALL questions

Marks for each question are shown in brackets

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

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

2. State, with reasons, a type of pump suitable for EACH of the following services:

   (a) main fresh water cooling circulation; - gear driven centrifugal pump – high flow (2)

   (b) Oily Water Separator supply; Positive Displacement Pump – Gear pump, jabsco impeller type – placed after the oily water separator system to reduce turbidity (2)

   (c) emergency fire pump; self driven self priming two stage centrifugal pump, (2)

   (d) steering gear; - Axial piston pump or heleshaw type pump for variable delivery (2)

   (e) fuel transfer. - positive displacement gear pump is good with different viscosities (2)

3. Sketch a block diagram of the layout of a compressed air system for supply of starting and control air. (10)
   Starting at 30 bar and control air is 8 bar page 54 of notes 236 notes
   Add and draw spark arissor and busting disk to drawing fusible plugs on each compressors and fusible plug and relief valve on the tanks, and trains,

4. Fig Q4 shows a hydraulic cylinder that operates a safety barrier. Explain the possible consequences of EACH of the following:

   (a) dirt in the hydraulic oil; the blocking in the valves, districting the movement of the ram in and out. Score the cylinder and score the seals resulting in leakage causing the ram to go out to fast and close to fast. (4) (6)

   (b) orifices being adjusted to be too large.

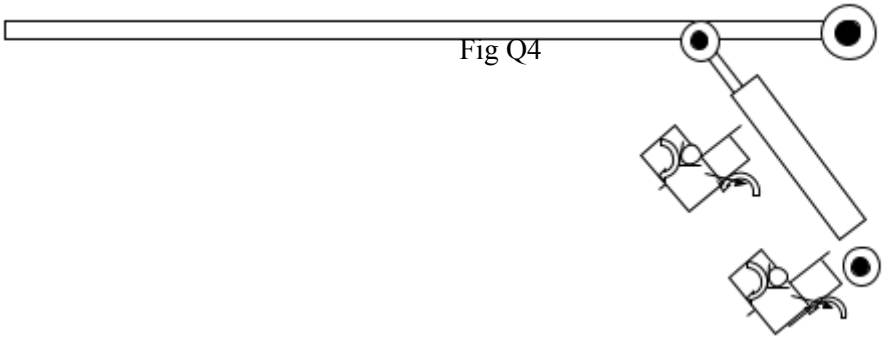

Fig Q4

5. Sketch a valve operated, rotary vane steering gear showing the hydraulic system from the directional valve to the rotary vane unit. (10)
Page 179 in notes

6. Whilst a single screw vessel is on passage it is noticed that an intermediate shaft bearing is running hot.

(5)

(a) State FIVE possible causes. Blocked coolor,not enough oil, miss alinement, high load,dirty oil.
(b) Cooler Fouled slow down, adjust trim. Concer with Master
(c) Clearances insufficent or too much (5)

Drain oil – examine oil and filter for contaminants, diver to another port. Monitor the bearing and trend it.

(d) Explain the procedure that should be followed in order to reach port for further investigation if there were no obvious causes.
If problem persists – Increase cooling – go slow

7. Describe, with the aid of a sketch, EACH of the following gear arrangements:

(a) double reduction; page 260 (5)
page 267 notes
(b) reversing. Page 253 notes (5)

8. With reference to induction motor starters:

(a) state when a STAR / DELTA starter may be required; page 424. When it is required to start a large motor. It would start in star then switchs to delta. It takes 9 times less in star than starting in delta (2)
(5)

(b) describe the operation of a STAR / DELTA starter; (3)

(c) explain why the motor configuration is changed from STAR to DELTA. Because the star motor does not have good toque carriterics

9. (a) Describe the construction of a *salient pole* a.c. generator rotor. (6)

(b) Explain how many poles would be required for a 50Hz supply, rotational speed of 750 rpm. Page 385 on notes (4)

F=n/p
Poles=frequency/(revs/sec)
#of Poles= 50/(750/60)
#Poles = 50/12.5
=8

10. With reference to fuse protection of electrical circuits:

(a) (i) state the advantages of a High Rupture Capacity fuse; It aborsbes the heat and lighting from the arc – (slow blow fuse) (3)

(2)

(b)

(ii) explain how the advantages in Q10(a)(i) are achieved;

(iii) The HRC contain silicon dioxide sand which absorbs the heat / energy. (5)

(c) explain why a fuse used for protection of a motor circuit differs from a fuse protecting a lighting circuit. By using a slow blow fuse the current rqamps up at the start and drops off to norma operating current without blow the fuse. If you used a normal fuse it will blow because it doesn't have the protection of a slow blow fuse.

(d)