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, 31 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 colleges:

Candidate's examination workbook

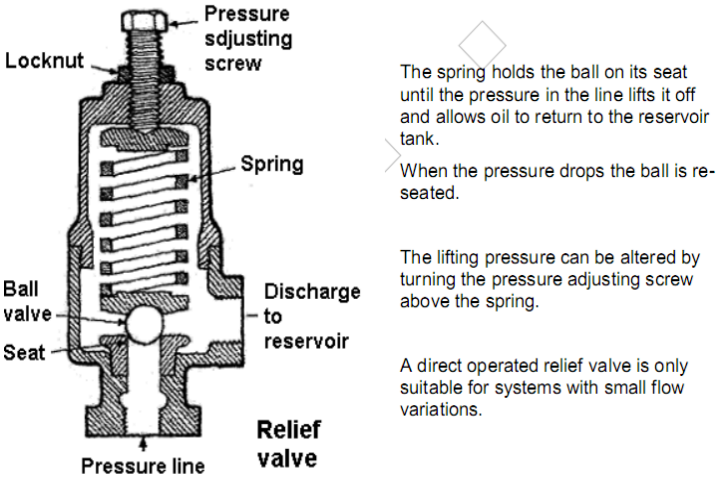
AUXILIARY EQUIPMENT

Attempt ALL questions

Marks for each question are shown in brackets

1. (a) Sketch a relief valve suitable for use on the air side of a compressor. (7)

(3)



(b) Explain how the valve sketched in Q1(a) is reset after overhaul. Bench Test by using a dead weight tester

2. (a) Explain how cavitations damage occurs within a pump. Pump cavitations accours when water on the low pressure side of the pump expand and collapse under low pressure causing the water to boil and creating a hammer affect. (6)

(4)

(b) State, with reasons, TWO operational causes of increased cavitation within a pump.

3. With reference to main propulsion shaft hydraulic sleeve type couplings:

(a) describe, with the aid of a sketch, the removal procedure; (7)
page 280 notes 478

(3)

(b) state how it is determined, during reassembly, that the push fit is complete. By a prescided line measured on the shaft.

4. With reference to water contamination of hydraulic systems:

(a) state possible sources of water; condensation, water inside the cooler. (2)

(b) explain the consequences; rust, corrosion, sludge, form an emulsion, micro comtamation in the oil. (5)

(3)

(c) describe the actions to be taken should it be suspected. First determine the source, drain the oil and flush tank, change filters and replace oil with bio side treatment

5. With reference to controllable pitch propellers:

(a) explain why they should maintain a small amount of pitch when in the neutral position; to maintain steerage of the vessel (3)

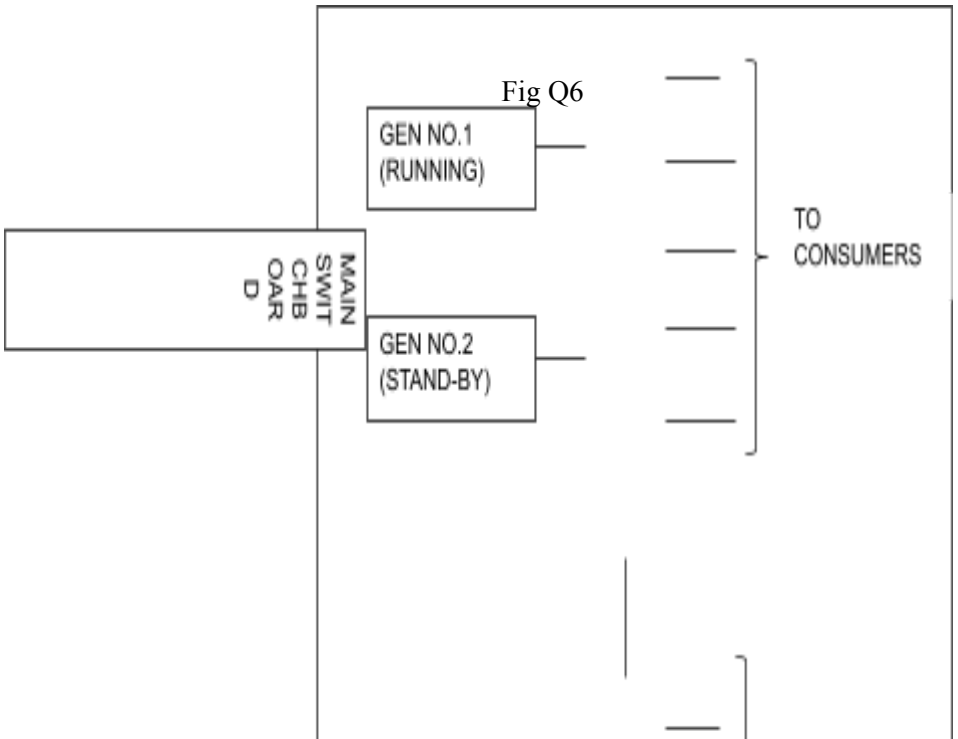
(b) state, with reasons, the failsafe position; 2 types – one will fail in the position it was in (4)
(c) 2 – will the spring loaded type that will fail in full ahead.
(d) When coming into port – a good practice is to operate the propolsion gear in ahead and astern to confirm your gear is working correctly before coming along side. (3)

(e) explain how pitch may be restored should hydraulic system failure occur.
Different CPP have different fail safe systems. Some have a connecting rod linkage that you can manually move to adjust the pitch – others have hand pumps and manual spool valves to change the pitch.

6. Fig Q6 shows the main generation layout of a fully automatic switchboard, No.1 generator is running, No.2 is on stand-by.

Describe the sequence that occurs to restore power should No.1 generator suffer a sudden failure. (10)

Fig Q6



Emergency generator starts up and powers up the emergency switch board, once powered up stb generator will take the load off the emergency switch board to the main switch board. Then shut down the emergency generator.

7. With reference to reduction gears, state the advantages and disadvantages of EACH of the following:

(a) helical teeth compared with spur teeth; (5)

Advanceages.Quiter, greater load bearing, Gbox is more compact.more suface area on gear area. (5)

Disadvanceages More Expensive Heaver Produce longitudinal Thrust

(b) double helix compared to single helix.

Double Helix dosen't worry about thrust
Quieter
Double is heavey

8. With reference to comparing modern water lubricated stern tube bearings with those that are oil lubricated:

(a) state THREE advantages; Non Pouting, No need to carry oil, Cheaper, Simpler (3)
(b) Sea water lubricates the bearing and is non polluting
(c) Ease of maintenance (7)
(d) Reduced operating cost

(e) state THREE disadvantages, explaining how EACH may be overcome.
(f) Sand gets in and attacks the shaft
(g) Can be overcome by seal ring at the end of the liner or provide water to seal from inboard flushing out wear debrie.
(h) Water doesn't have the same lubricating qualities of oil – Can use new polymer type bearings with new biodegradable water based lubricants to help with sealing.
(i) Galvanic action of salt water on the shaft in the tube it self.

9. Describe the construction of a three phase induction motor of the caged rotor type. (10)

Squirrel Cage Motor page 417 notes 478

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

(a) state why the preference trip is fitted; So essential services can be maintained in the event of demand from the switchboard (1)
(b) (6)
(c) explain the operation of a two-stage preference trip; load is passed to a solenoid coil which operates the trip. page 401. (3)

(d) state THREE circuits that can <u>not</u> be connected to the preference trip.
(e) Emergency Circuits - Communication, Emergency Lights, Nav Lights,