MERCHANT MARINE ACADEMY OF MACEDONIA
SCHOOL OF ENGINEERS

Course: Maritime English
Academic year: 2017 – 2018 **Name:**
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Instructor: A. Birbili **Exam paper grade:**

FINAL EXAM

1. Fill in the gaps using the words in the list below. There are two extra words. (15 p.)

stress crankpin torque uniflow axial inlet

reciprocating fatigue mounting horizontal torsional

vertical centrifugal hull attenuate exhaust forward

-- The shaft-generated _____ vibration can be defined as the oscillation of the shaft in _____ and aft directions, parallel to the shaft _____ line.
-- _____ vibration is a twisting phenomenon in the crankshaft which spreads from one end to the other due to uneven _____ pulses coming from different unit pistons.
-- The _____ motion of the piston in an engine cylinder creates out-of-balance forces acting along the cylinder, while the _____ force associated with the _____ rotation creates a rotating out-of-balance force.
-- Elastomer-based _____ systems are used to suppress or _____ noise and vibration in ships.
-- The vibration level must not result in _____ levels that may cause _____ damage to the engine or the connected _____ structure.
-- 2-stroke engines with an _____ valve mounted in the cylinder head are known as _____ scavenged engines.

2. Complete the following text with an appropriate word. In some cases the first letter is given. (15 p.)

A basic part of the cycle of an _____ combustion engine is the supply of fresh air and the removal of exhaust gases. This is the gas exchange process. **S**_____ is the removal of exhaust gases by blowing in fresh air. **C**_____ is the filling of the engine cylinder with a supply of fresh air ready for compression. With **s**_____, a large mass of air is supplied to the cylinder by blowing it in under **p**_____. Older engines were "naturally aspirated" – taking fresh air only at _____ pressure. Modern engines make use of exhaust gas driven **t**_____ to supply pressurised fresh air. On 2-stroke engines, an electrically driven auxiliary **b**_____ is usually installed because the air provided at _____ engine speeds is not enough. This pressurised air is then cooled to increase its **d**_____.

3. Complete the sentences with the correct derivative of the word in the parenthesis. (20 p.)
-- Silicone is a highly _____ **(viscosity)** fluid.

-- High levels of vibration may cause _____ **(form)** or _____ **(break)** of the engine components.
-- _____ **(satisfy)** scavenging depends on efficient _____ **(evacuate)** of exhaust gases and minimum _____ **(lose)** of fresh air through the exhaust passage.
-- Insulation techniques and the _____ **(prevent)** of local resonance are used to keep the vibrations in the accommodation and at other locations within _____ **(accept)** levels.
-- High levels of noise may cause _____ **(comfort)** and _____ **(annoy)** to the crew.
-- Log books record all sludge and garbage _____ **(dispose)** operations.
-- Any prolonged _____ **(expose)** to levels of 85dB or above is likely to lead to hearing problems in the _____ **(absent)** of ear protection.
-- Ship machinery _____ **(install)** have two principal sources of _____ **(excite)**: the main engine and the _____ **(propel)**.
-- Log books are _____ **(office)** records. Wrong _____ **(enter)** should be crossed out and the correct ones must be written beside them along with the _____ **(sign)** of the _____ **(authority)** officer.

4. Match the following terms from physics and mechanics to their definitions. There is one extra term. (10 p.)

torsion *oscillation* *natural frequency* *vibration* *damp*

amplitude *frequency* *resonance* *damper* *velocity* *detune*

-- the speed of something in a particular direction:
-- frequency at which a system oscillates when it is not subjected to a continuous or repeated external force:
-- the greatest distance that a sound or radio wave vibrates:
-- twisting, esp. of one end of sth while the other end is held fixed:
-- the sound or other vibration produced in an object by sound or vibrations of a similar frequency from another object:
-- reduce the amplitude of a sound source:
-- change the frequency (of an oscillatory system) away from a state of resonance:
-- a continuous quick, slight shaking movement:
-- the rate at which a sound (or electromagnetic wave) vibrates:
-- movement back and forth in a regular rhythm:

5. Match the following words to their synonyms. (5 p.)

reverberate *aperture* *defect* *stiff* *align*

enhancement *replenish* *resilient* *feasible* *counteract*

-- refill:
-- rigid, firm:
-- able to return to an original shape after being pushed, stretched, bent, etc:
-- make ineffective or neutralise the bad effects of sth by using an opposite force:
-- an opening, hole or gap:
-- arrange in a straight line:
-- reinforcement:
-- (of a sound) to be repeated several times:
-- able and possible to be done:
-- fault:

6. Fill in the gaps using the words in the list below. There are two extra words. (15 p.)

neat measurements data damp breakdown references

turbocharger injection claims deteriorating detune

exhaust over-writing near problems dynamic emissions

-- The _____ from the log books is often used for insurance _____ in case of accidents and _____ misses are discussed during safety meetings as _____ that can help in making safety plans.
-- Engineers working in the engine room must ensure that the log book is kept _____ and clean without oil smudges or _____.
-- In most cases, the practical means to reduce vibration is simply to _____ the lowest natural frequencies away from the main _____ excitation frequencies.
-- On the basis of engine noise _____ and frequency analyses, as per MAN Diesel, it can be determined that noise _____ from 2-stroke engines primarily originate from the _____ (air and gas pulsations), _____ valves and fuel oil _____ systems.
-- The aim of vibration analysis is to determine the _____ condition of equipment before it leads to a _____.

7. Match the words to make appropriate collocations. (5 p.)

-- piston ……....	conditions
-- working……..	order
-- flexible……...	crankpin
-- firing……..	seizure
-- fatigue…….	operation
-- scored……	time
-- at any given……	inspection
-- remaining……...	of machinery
-- PSC…….	on board
-- bunkering……	coupling

8. Read the following article and answer the questions that follow. (15 p.)

Some engine surfaces on board a vessel can heat up to more than 600 degrees Celsius. That is, if you don't protect them. With the right equipment, however, the engine room is a safe place to work.

The sailor’s profession used to be a hazardous one. Thousands of wrecks scattered all around the seabed of our oceans testify that in the old days, sailors who ventured out to sea did not always return. Luckily today seafarers can go to work and rely on returning home. But that doesn't mean you can overlook safety issues. These days, a fire in the engine room is the most serious safety risk.

“'What if there is a fire in the engine room?' is a question that pops into the mind of anyone who ever gets to work down there," says Jyrki Salo.

Salo worked as a marine engineer for over seven years. These days he's stationed on land in Wärtsilä Services' Turku office in Finland, where he's the Product Manager for large bore and 4-stroke solutions.

Every second counts.

Things get hot in an engine room: some parts can have temperatures exceeding 600 degrees Celsius. These parts must be properly covered.

The SOLAS (Safety of Life at Sea) convention, ratified by the IMO, aims to keep merchant ships safe. The treaty has several chapters, but in short it limits how hot the surfaces of certain engine components are allowed to be, in order to cut the risk of fire. It also defines what kind of spray or splash protection should be used near flammable liquid systems such as the fuel and lubricating oil system.

By installing SOLAS solutions on turbochargers, exhaust gas pipes and fuel and oil spray/splash protection, engine room surface temperatures can be kept below 220 degrees Celsius, in line with SOLAS regulations.

"A fire in the engine room typically originates in a failure in the fuel and lubricating oil system, which is then followed by impingement of oil onto a high temperature surface," explains Salo.

Wärtsilä's SOLAS solutions keep the fuel and the heat away from each other, as the hot surfaces are lined.

Why now?

The SOLAS convention has been in force for over ten years, and awareness of engine room safety is now at an all-time high. The trend has also materialised in the order book for Wärtsilä's SOLAS solutions. It's partly due to the fact that the average installation base is reaching the age when safety upgrades are being considered. But a big driver is the overall raised level of safety awareness (we all ride a bike with a helmet these days, right?). It has stirred up the shipping industry as well, with owners and operators getting on trend. News of near-misses and engine room fires spread like digital wildfire in these times of social media, too.

New ships are built to be SOLAS-compliant. A fire down in the engine room tends to have a paralyzing effect on the whole vessel. This is the reason why dual engine rooms are becoming increasingly common on modern ships – should a fire occur in one of the engine rooms, the other one is still operable.

(Retrieved: 11 June, 2015 from www.wartsila.com)

True or False?

- The sailor’s profession was not as safe in the past as it is now.
- Nowadays, the most serious safety risk is flooding in the engine room.
- The temperature of some unprotected engine components and engine room surfaces can be higher than 600 degrees Celsius.
- The convention which aims to keep merchant ships safe is the MARPOL.
- The whole shipping industry cannot realise the importance of engine room safety concerning fire.
- A fire in the engine room can dramatically affect the operation of the whole vessel.

Answer the questions

1. What does the great number of shipwrecks testify?
2. What are some of the requirements of the SOLAS convention?
3. How can engine room surface temperatures be kept below 220 degrees Celsius?
4. As per Jyrki Salo, how can a fire in the engine room start?
5. Why are modern ships built with dual engine rooms?

GOOD LUCK!!!