

**MERCHANT MARINE ACADEMY OF MACEDONIA
SCHOOL OF ENGINEERS**

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FINAL EXAM

1. Complete the following text using the words in the list below. (15 p.)

excitation practical study damper vibration mountings order dominating

advanced effective dynamic detune turbocharger structures reduction

The increasing demand for lowering the noise and _____ levels of engines has forced manufacturers to make use of _____ analysis and simulation tools. In most cases, the _____ means to reduce vibration is simply to _____ the lowest natural frequencies away from the main _____ excitation frequencies. When detuning natural frequencies, the most _____ course is to concentrate on the heavy _____ built on to the engine and its _____. A good example is the _____, because its influence on the vibration system is very _____ due to its relatively large mass. Concerning the _____ of vibration on the Wartsila 9L46 engine, a _____ ended up with two different solutions: for the current production engines, a new firing _____ was introduced, offering a better distribution of the _____ forces at certain harmonic orders. However, for engines already in the field, a tuned mass _____ was chosen as the most suitable solution.

2. Complete the sentences with the correct form of the words in parentheses. (20 p.)

- The lube oil should be checked regularly for water and _____ (**contaminate**).
- Vibration must not result in _____ (**annoy**) and _____ (**comfort**) for the crew.
- Silicone is a highly _____ (**viscosity**) fluid.
- High levels of vibration may cause _____ (**form**) or _____ (**break**) of the engine components.
- Any accidents, such as _____ (**collide**) or _____ (**ground**), should be noted down in the logbook.
- As per MAN Diesel, noise _____ (**emit**) from 2-stroke engines can primarily originate from the turbocharger, exhaust valves or fuel oil _____ (**inject**) systems.
- Insulation techniques and the _____ (**prevent**) of local resonance are used to keep the vibrations in the accommodation and at other locations within _____ (**accept**) levels.
- Vibration analysis can be conducted by _____ (**maintain**) engineers, who use _____ (**rely**) methods that produce written data.
- Any prolonged _____ (**expose**) to noise levels of 85dB or above is likely to lead to hearing problems in the absence of ear _____ (**protect**). 140dB or above is likely to be physically _____ (**pain**).
- _____ (**satisfy**) scavenging depends on efficient _____ (**evacuate**) of exhaust gases and minimum _____ (**lose**) of fresh air through the exhaust passage.

3. Complete the following sentences with an appropriate preposition. You can choose from the following: (15 p.)

above, on, with, into, in, at, through, of, from

- Installing a permanent type vibration meter on critical machines can give us signs of wear and tear to be rectified well _____ advance before the fault converts _____ an expensive problem.
- The speed of something _____ a particular direction is called velocity.
- Conventional 2-stroke diesel engines are fitted _____ exhaust ports located just _____ the scavenge ports.
- The presence _____ water and dirty particles in the lube oil combined _____ severe vibrations may speed up the damage process.
- In the engine room, there are many noise transmission paths _____ which vibrational energy is transferred _____ one area to another.
- The rate _____ which a sound vibrates is called frequency.
- The following entries must be filled in the engine logbook:
 - the position of the ship _____ sea, _____ port or _____ anchorage.
 - speed of the ship _____ knots.
 - main engine rpm and load _____ the engine.

4. Fill in the gaps using the words in the list below. (15 p.)

removing parallel uniflow cooled atmospheric oscillation blowing loop

turbochargers crown low axial frequency aspirated auxiliary

- Modern engines make use of exhaust gas driven _____ to supply pressurised fresh air. This pressurised air is then _____ to increase its density.
- On 2-stroke engines, an electrically driven _____ blower is usually installed because the air provided at _____ engine speeds is not enough.
- Scavenging is the process of _____ exhaust gases from the cylinder by _____ in fresh air.
- Older engines were “naturally _____” – taking fresh air only at _____ pressure.
- In _____ -scavenged engines, the flow of scavenging air is in one direction.
- The _____ damper is fitted on the crankshaft of the engine to dampen the _____ of the shaft in forward and aft directions, _____ to the shaft horizontal line.
- Detuners are used to alter the _____ of the vibrating machinery reducing the vibration of the engine.
- In _____ -scavenged engines, the charge air passes over the piston _____ and rises to form a loop within the cylinder, expelling the exhaust gases.

5. You will read an article about fire in the engine room. Ten phrases have been extracted from the article. Write the correct number in front of the phrases. (15 p.)

- cause is oil leaking from pipes under high
- is functioning so that any leakage
- from being sprayed over a hot
- frequently checked and immediately renewed
- fine spray that will readily ignite upon contact
- with fuel from the high-pressure line
- has experienced it will undoubtedly agree
- evacuate the engine room within
- of the high risk and severe consequences
- quick-closing valve mechanisms

As any seafarer who ...[1]..., a fire at sea is a frightening experience. The fire brigade may be thousands of miles away! The most common ship fire is in the engine room, and the usual ...[2]... pressure, specifically from the fuel pump discharge.

When a high-pressure fuel line fractures or a gland leaks, fuel oil is released as a ...[3]... with a hot surface such as the engine exhaust. The resulting blaze is immediately fierce, and being constantly fed ...[4]..., will rapidly become impossible to fight with extinguishers and hoses. It will probably be necessary to ...[5]... a few minutes, and use the remote stops to stop the pump and shut off the fuel supply. Damage will be severe, with a high risk of loss of life, and the ship may well be lost.

Because ...[6]... from high-pressure oil line leaks, the fuel oil pump discharge lines are double-skinned so that any fuel leaks are contained and the leakages are safely drained into a tank. The integrity of the outer skin is essential to prevent any leaking oil ...[7]... surface, and the subsequent fire.

DO regularly check the fuel oil drain tank and ensure the alarm ...[8]... from the inner pipe is detected.

DO ensure that the outer protective skin of fuel oil pump discharge lines is ...[9]... if any damage is found.

DO confirm that the remote stops and ...[10]... work by regular testing, and that the ship's crew know where they are and how to use them.

(Retrieved: 09 September, 2015 from www.britishmarine.com)

6. Match the following words to their synonyms. (15 p.)

breakdown counteract fracture cavity feasible near miss attenuate resilient

deformation erratic align mandatory slacken aperture hazard

- danger:
- a narrowly avoided accident:
- reduce:
- not regular, unpredictable:
- breakage:
- an opening, hole or gap:
- balance with an equal force so as to make ineffective:
- obligatory:
- able to return to an original shape after being pushed, stretched, bent, etc:
- loosen:
- change of shape:
- failure (of engine):
- an empty space within a solid object, or between two surfaces:
- arrange in a straight line:
- able and possible to be done:

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

- | | |
|----------------------|--------------|
| -- bottom-end..... | inspection |
| -- flexible..... | temperature |
| -- scavenge air..... | hours |
| -- PSC..... | coupling |
| -- running..... | pressure |
| -- natural..... | bearing |
| -- stern..... | disposal |
| -- air bottle..... | of machinery |
| -- fatigue..... | frequency |
| -- garbage..... | tube |

GOOD LUCK!!!