

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

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Name:

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FINAL EXAM

1. Fill in the gaps using the words from the list. There are two (02) extra words.
(15 p.)

*uniflow performance bearing firing mounting bracing loop resonator
compartments fatigue rod decrease diffuser hull misses mandatory crown*

- One end of the top _____ is fitted at the upper part of the main engine, and the other is attached to a very stiff location in the _____ of the ship.
- In _____-scavenged engines, the flow of scavenging air is in one direction.
- A new _____ order for the current production engines offers a better distribution of the excitation forces at certain harmonic orders.
- High levels of vibration may cause _____ damage to the engine.
- In the _____ where the noise level is excessively high, the use of ear defenders is _____.
- Elastomer-based _____ systems are used to suppress or attenuate noise and vibration in ships.
- Additional noise reduction measures may include a Helmholtz _____ lining in the scavenge air pipe and/or a low noise _____ for the turbocharger compressor.
- In _____-scavenged engines, the charge air passes over the piston _____ and rises to form a circle within the cylinder.
- Unusual changes in the _____ of machinery, sudden increase or _____ in parameters, accidents, near _____, or breakdown of any equipment should be noted down in the log book.

2. Complete the following sentences with an appropriate word. The first letter is given. (15 p.)

- Scavenging is important because it affects the overall efficiency of the engine, the power output and the fuel c_____.
- Detuners are used to alter the f_____ of the vibrating components thus reducing the vibration of the engine.
- Scavenging is the process of removing e_____ gases from the cylinder after combustion by blowing in fresh air.
- A basic part of the cycle of an i_____ combustion engine is the gas exchange process.

- On 2-stroke engines, an electrically driven auxiliary **b**_____ is usually installed because the air provided at low engine **s**_____ is not enough.
- Poor combustion, lube oil contamination, piston **r**_____ wear, as well as high mean **t**_____ in the cylinder, are some of the problems resulting from incomplete scavenging.
- The pressurised air supplied by the **t**_____ is cooled to increase its density before entering the cylinder.
- With supercharging, a large mass of air is supplied to the engine cylinder by blowing it in under **p**_____.

3. Match the following words to their synonyms/explanations. (10 p.)

fretting, slacken, breakdown, aperture, feasible,
fracture, align, deformation, mandatory, scored

- failure (of engine):
- arrange in a straight line:
- wear caused by friction:
- loosen:
- able and possible to be done:
- breakage:
- change of shape:
- with deep scratches:
- an opening, hole or gap:
- obligatory:

4. Complete the sentences with the appropriate form of the words in parentheses. (15 p.)

- There are many noise _____ (**transmit**) paths through which vibrational energy is transferred from one area to another.
- According to ISO criteria, vibrations of 10 mm/sec are not _____ (**accept**).
- Vibration _____ (**measure**) should be carried out to assure that the vibration level is within ISO requirements.
- It is _____ (**significance**) to note down the relevant information at a place (paper or electronic logbook) for future reference and _____ (**retrieve**).
- Most of the readings and _____ (**enter**) noted down in the log book can also be taken from the control room, although it is _____ (**advise**) to take local readings.
- Comparing previous data of machinery parameters with current data can help us to plan maintenance more _____ (**effect**).
- Vibration analysis on a regular basis is needed to predict the _____ (**operate**) health of equipment.
- Any prolonged _____ (**expose**) to levels of 85 dB or above can severely affect your hearing in the absence of ear _____ (**protect**).

- The most famous type of torsional damper used on marine engines is the _____ (**viscosity**) type damper.
- Amplitude and frequency are _____ (**measure**) parameters that are used to describe vibration.
- Vibration analysis can be conducted by maintenance engineers who use _____ (**rely**) methods that produce written data.
- Every running machine has a _____ (**tend**) to vibrate.

5. Circle the correct answer. (25 p.)

- To __ means to change the frequency (of an oscillatory system) away from a state of resonance.
 - a. attenuate b. detune c. absorb d. dampen
- __ is the speed of something in a particular direction.
 - a. Volume b. Amplitude c. Frequency d. Velocity
- The twisting of an object due to forces which tend to turn one end about a longitudinal axis while the other end is held fixed is __.
 - a. oscillation b. torsion c. vibration d. rotation
- __ is a way of controlling vibrations.
 - a. Stabilising b. Arranging c. Balancing d. Bracing
- The most famous type of torsional damper consists of an inertia ring which is enclosed in a thin layer of __.
 - a. silicone b. grease c. silicon d. rubber
- __ is the greatest distance that a wave, especially a sound or radio wave, vibrates.
 - a. Speed b. Amplitude c. Velocity d. Frequency
- The sound or other vibration produced in an object by sound or vibrations of a similar frequency from another object is called __.
 - a. resonance b. natural frequency c. volume d. vibration
- Slow __ is the easiest way to reduce fuel oil consumption.
 - a. operating b. running c. sailing d. steaming
- Older engines were "naturally __" - taking fresh air only at atmospheric pressure.
 - a. scavenged b. charged c. aspirated d. loaded
- __ is the frequency at which a system oscillates when it is not subjected to a continuous or repeated external force.
 - a. Oscillation b. Resonance c. Natural frequency d. Attenuation
- The __ damper is used to suppress the stresses on the crankshaft which result from varying torque pulses.
 - a. rotational b. twisting c. axial d. torsional
- __ transfer the rocking vibration of the engine to the hull of the ship.
 - a. Bracings b. Shock-absorbers c. Balancers d. Dampers
- An entry for all the lube oil __ on board must be made in the engine room log book every day.
 - a. staying b. resting c. remaining d. keeping
- The data from the log book is often used as evidence in case of insurance __ arising after an accident.
 - a. demands b. requirements c. claims d. questions
- It is of __ importance to note down the readings of important machinery in the engine room log book.
 - a. prime b. basic c. main d. best

- The data in the log book should be properly ___ for future references.
a. visibly b. vision c. visibility d. visible
- ___ is the process in which an atom, or other particle, adopts a higher energy state when energy is applied.
a. Amplitude b. Excitement c. Excitation d. Attenuation
- The purpose of the gas exchange process is to remove the burnt gases at the end of the ___ stroke and admit fresh air for the next cycle.
a. suction b. intake c. compression d. power
- Installing a permanent type vibration meter on critical machines can give us signs of wear and ___ to be rectified well in advance before the fault converts into an expensive problem.
a. tear b. fretting c. damage d. fear
- The aim of vibration analysis is to determine the ___ condition of equipment before it leads to a breakdown.
a. normal b. deteriorating c. improving d. optimum
- When vibrations occur in big-sized engines operating under heavy loads, the ___ of vibration is magnified, because of large mass rotation.
a. weight b. volume c. level d. intensity
- All important machinery parameters noted down in the log book can be compared with the design and ___ conditions at regular intervals in order to analyse the performance of engine room machinery and systems.
a. check b. effort c. trial d. sea
- The ___ damper is fitted on the crankshaft to dampen the oscillation of the shaft in forward and aft directions.
a. axial b. rotational c. linear d. torsional
- The speed of the ship in ___ is also recorded in the log book.
a. miles b. kilometers c. nautical miles d. knots
- The piston ___ of a loop-scavenged engine is longer than that of a uniflow-scavenged one.
a. rod b. skirt c. pin d. crown

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

- | | |
|--------------------|------------|
| -- bottom-end..... | inspection |
| -- remaining..... | crankpin |
| -- scored..... | hours |
| -- PSC..... | on board |
| -- running..... | seizure |
| -- natural..... | bearings |
| -- track..... | soundings |
| -- piston..... | wing |
| -- bridge..... | frequency |
| -- tank..... | record |

7. Complete the sentences with an appropriate preposition from the list below. Some prepositions can be used more than once. (15 p.)

up, for, at, in, on, from, during, with, within

- The presence of water and contaminants _____ the lube oil combined with severe vibrations may speed _____ the damage process.
- Vibration must not result _____ annoyance and/or discomfort for the crew.
 - If the engine has a power turbine connected to its crankshaft via a reduction gear, then flexible coupling is used to compensate _____ the vibration occurring _____ motion transfer.
- Loop-scavenged engines are fitted _____ exhaust ports located just above the scavenge ports.
- The power output of an engine _____ a given speed is proportional to the mass flow rate of air.
- In order to prevent the log book _____ getting torn or spoilt, you should use a proper cover or case _____ protection.
- Insulation techniques are used to keep the vibrations _____ permissible levels.
- 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.

