

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

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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 expelling bearing firing mounting bracing loop resonator  
compartments neat rod excitation diffuser stiff liner mandatory crown*

- In the \_\_\_\_\_ where the noise level is excessively high, the use of ear defenders is \_\_\_\_\_.
- 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 \_\_\_\_\_ forces at certain harmonic orders.
- The log book must be kept \_\_\_\_\_ and clean without oil smudges or over-writing.
- In \_\_\_\_\_-scavenged engines, the charge air passes over the piston \_\_\_\_\_ and rises to form a circle within the cylinder, \_\_\_\_\_ the exhaust gases through exhaust ports cut in the same side of the \_\_\_\_\_ above the scavenge ports.
- One end of the top \_\_\_\_\_ is fitted at the upper part of the main engine, and the other is attached to a very \_\_\_\_\_ location in the hull of the ship.
- 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.

**2. Complete the following sentences with an appropriate word. In most cases the first letter is given.** (15 p.)

- A basic part of the cycle of a(n) \_\_\_\_\_ combustion engine is the gas exchange process.
- On 2-stroke engines, an electrically driven auxiliary \_\_\_\_\_ is usually installed because the \_\_\_\_\_ provided at low engine speeds is not enough.
- 5-cylinder auxiliary engines are more probable to cause v\_\_\_\_\_ problems than 6 or 8-cylinder engines.

- Detuners are used to alter the **f** \_\_\_\_\_ of the vibrating components thus reducing the vibration of the engine.
- **S** \_\_\_\_\_ is the process of removing exhaust gases from the cylinder after combustion by blowing in fresh air.
- 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 turbocharger is cooled to increase its **d** \_\_\_\_\_ 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. There is one (01) extra word. (15 p.)**

*fretting, slacken, near miss, breakdown, resilient, aperture, feasible, scored*

*stiff, fracture, align, reverberate, tamper with, deformation, aspirate, mandatory*

- make changes to something without permission, interfere with: .....
- rigid, difficult or impossible to bend: .....
- a narrowly avoided accident: .....
- failure (of engine): .....
- arrange in a straight line: .....
- provide an ICE with air: .....
- wear caused by friction: .....
- loosen: .....
- change of shape: .....
- with deep scratches: .....
- an opening, hole or gap: .....
- able and possible to be done: .....
- breakage: .....
- (of a sound) to be repeated several times: .....
- obligatory: .....

**4. Complete the sentences with the appropriate form of the words in parentheses. (20 p.)**

- It is \_\_\_\_\_ (**significance**) to note down the relevant information at a place (paper or electronic logbook) for future reference and \_\_\_\_\_ (**retrieve**).
- \_\_\_\_\_ (**satisfy**) scavenging depends on efficient \_\_\_\_\_ (**evacuate**) of exhaust gases and minimum \_\_\_\_\_ (**lose**) of fresh air through the exhaust passage.
- 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.

- 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.
- There are many noise \_\_\_\_\_ (**transmit**) paths through which vibrational energy is transferred from one area to another.
- Comparing previous data of machinery parameters with current data can help us to plan maintenance more \_\_\_\_\_ (**effect**).
- Scavenging is important because it affects the overall \_\_\_\_\_ (**efficient**) of the engine, the power output and the fuel \_\_\_\_\_ (**consume**).
- 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.
- 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**).

**5. Circle the correct answer. (15 p.)**

- 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
- 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
- Slow \_\_\_\_ is the easiest way to reduce fuel oil consumption.
- a. operating    b. running                              c. sailing                              d. steaming
- 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
- 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 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
- 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
- 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

**6. Complete the sentences with an appropriate preposition from the list below. Some prepositions can be used more than once. (10 p.)**

*up, for, at, in, from, via, with, within*

- Vibration must not result \_\_\_\_\_ annoyance and/or discomfort for the crew.
- If the engine has a power turbine connected to its crankshaft \_\_\_\_\_ a reduction gear, then flexible coupling is used to compensate \_\_\_\_\_ the vibration occurring during motion transfer.
- Loop-scavenged engines are fitted \_\_\_\_\_ exhaust ports located just above the scavenge ports.
- The presence of water and contaminants \_\_\_\_\_ the lube oil combined with severe vibrations may speed \_\_\_\_\_ the damage process.
- 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.

**7. State whether the following sentences are True (T) or False (F). (10 p.)**

- The data from the log book is never used as evidence in case of insurance claims arising after an accident.
- Amplitude is the smallest distance that a sound or radio wave vibrates.
- With supercharging, a large mass of air is supplied to the engine cylinder by blowing it under pressure.
- To **attenuate** means to change the frequency (of an oscillatory system) away from a state of resonance.
- The viscous type damper consists of an inertia ring which is enclosed in a thin layer of silicon.
- The piston skirt of a loop-scavenged engine is longer than that of a uniflow-scavenged one.
- Scavenging is important because it affects the overall efficiency of the engine.
- To **damp** means to increase the amplitude of a sound source.
- On a ship, the sources of vibration and/or noise are generally the propeller, the various diesel engines and even the waves at sea.
- You must use only pencil to fill in the log book.

