

**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 (2) extra words. (15 p.)**

*detuners reduction uniflow generated bonded fractures loop rod motion*

*resonance conduct emitted turbine dampers preventive amplitude crown*

- The axial damper is fitted on the crankshaft of the engine to dampen the shaft-\_\_\_\_\_ axial vibration.
- In \_\_\_\_\_-scavenged engines, the flow of scavenging air is in one direction.
- If the engine has a power \_\_\_\_\_ connected to its crankshaft via a \_\_\_\_\_ gear, a flexible coupling is used to compensate for the vibrations that occur during \_\_\_\_\_ transfer.
- Advances in engine design that aim at economy and efficiency, also lead to noise \_\_\_\_\_ at higher frequencies.
- \_\_\_\_\_ is the vibration produced in an object by another object vibrating at a similar frequency.
- \_\_\_\_\_ are used to alter the frequency of the vibrating components.
- In \_\_\_\_\_-scavenged engines, the charge air passes over the piston \_\_\_\_\_ and rises to form a circle within the cylinder.
- Rubber-to-metal \_\_\_\_\_ systems are the most common anti-vibration mountings.
- Maintenance engineers who work in specialist companies can \_\_\_\_\_ vibration analysis, which is an example of \_\_\_\_\_ maintenance.
- \_\_\_\_\_ is the greatest distance that a sound or radio wave vibrates.
- In extreme cases, vibration may result in \_\_\_\_\_ in the structure of an engine.

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

- External \_\_\_\_\_ (**insulate**) of the scavenge air receiver and air cooler can be an \_\_\_\_\_ (**add**) noise reduction measure.
- Vibration analysis on a regular basis is needed to predict the \_\_\_\_\_ (**operation**) health of equipment.
- Deflection measurements are taken to check the \_\_\_\_\_ (**align**) of the crankshaft.
- In a 2-stroke marine \_\_\_\_\_ (**propel**) engine, vibrations may cause wear of internal components.
- \_\_\_\_\_ (**satisfy**) scavenging depends on the minimum \_\_\_\_\_ (**lose**) of fresh air through the exhaust passage.
- When the noise level is up to 80dB, the use of hearing \_\_\_\_\_ (**protect**) is optional.
- Scavenging is important because it affects the overall \_\_\_\_\_ (**efficient**) of the engine, the power output and the fuel \_\_\_\_\_ (**consume**).

- Wrong log book \_\_\_\_\_ (**read**) should be crossed out and the correct ones must be written beside them along with the \_\_\_\_\_ (**sign**) of the authorised officer.
- Vibration must not result in \_\_\_\_\_ (**annoy**) and/or \_\_\_\_\_ (**comfort**) for the crew.
- There are many noise \_\_\_\_\_ (**transmit**) paths through which vibrational energy is transferred from one area to another.
- Any prolonged \_\_\_\_\_ (**expose**) to levels of 85dB or above can severely affect your hearing.
- All sludge and garbage \_\_\_\_\_ (**dispose**) operations should be recorded in the log book.
- There are two basic criteria for determining \_\_\_\_\_ (**accept**) in the level of vibrations.
- It is the shipyard's \_\_\_\_\_ (**responsible**) to cover the engine room walls with absorbent material for noise attenuation.
- The lube oil should be checked regularly for water and \_\_\_\_\_ (**contaminate**).

### 3. Circle the correct answer. (20 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
- The viscous type damper consists of an inertia ring which is enclosed in a thin layer of \_\_\_.
  - a. silicon    b. grease    c. silicone    d. rubber
- 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 piston \_\_\_ of a loop-scavenged engine is longer than that of a uniflow-scavenged one.
  - a. rod    b. skirt    c. pin    d. crown
- 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
- 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. power    b. intake    c. suction    d. compression
- 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

-- \_\_\_ 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

-- 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 presence of water and dirt \_\_\_ in the lube oil combined with severe vibrations may speed up the damage process.

- a. parts    b. material    c. pieces    d. particles

-- 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 speed of the ship in \_\_\_ is also recorded in the log book.

- a. miles    b. kilometers    c. nautical miles    d. knots

-- On the bridge wings the maximum noise level is 70dB, as per IMO recommendations. This requirement can be satisfied by installing a suitable exhaust gas \_\_\_.

- a. boiler    b. scrubber    c. silencer    d. absorber

-- Near \_\_\_ are discussed during safety meetings as references that can help in making safety plans.

- a. losses    b. misses    c. accidents    d. incidents

**4. Match the following words to their synonyms/definitions below. There is one (1) extra word. (15 p.)**

*attenuate, aperture, diverse, erratic, rectify, defective, stiff, breakdown, feasible, adequate, reverberate, scored, piston seizure, tamper with, neat, mandatory*

-- correct, bring something to its former condition:

-- stop moving because of excessive pressure, temperature or friction:

-- (of a sound) to be repeated several times:

-- rigid, difficult or impossible to bend:

-- make changes to something without permission:

-- obligatory:

-- able to be achieved:

-- sufficient:

-- failure (of engine):

-- tidy:

-- an opening, hole or gap:

-- various:

-- with deep scratches:

-- reduce the intensity or force:

-- faulty:

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

-- The engine room log book is a track r\_\_\_\_\_ of all machinery parameters.

-- Older engines were "naturally aspirated", that is, they took fresh air only at a\_\_\_\_\_ pressure.

-- The bolts are too tight; they need l\_\_\_\_\_.

- On 2-stroke engines, an electrically driven **a** \_\_\_\_\_ blower is usually installed because the air provided at low engine **s** \_\_\_\_\_ is not enough.
- A basic part of the cycle of an internal combustion engine is the gas **e** \_\_\_\_\_ process.
- The pressurised air supplied by the **t** \_\_\_\_\_ is cooled to increase its density before entering the cylinder.
- Poor combustion, piston **r** \_\_\_\_\_ wear, lube oil contamination, as well as high mean **t** \_\_\_\_\_ in the cylinder, are some of the problems resulting from incomplete scavenging.
- The position of the ship at sea, in **p** \_\_\_\_\_ or at anchorage should be noted down in the log book.

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

- |                    |              |
|--------------------|--------------|
| -- overheated..... | bracing      |
| -- tank.....       | tube         |
| -- bunkering.....  | seizure      |
| -- of prime.....   | inspection   |
| -- top.....        | operation    |
| -- piston.....     | of machinery |
| -- bottom-end..... | importance   |
| -- stern.....      | soundings    |
| -- fatigue.....    | crankpin     |
| -- PSC.....        | bearing      |

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

- It makes no difference if you have the engine control room open or closed; the control room still provides the same noise insulation.
- The data from the log book is never used as evidence after an accident.
- Frequency is the rate at which a sound (or electromagnetic wave) vibrates.
- With supercharging, a large mass of air is supplied to the engine cylinder by blowing it in under pressure.
- The torsional damper is fitted on the crankshaft to dampen the oscillation of the shaft in fore and aft directions.
- 2-stroke diesel engines with an exhaust valve mounted in the cylinder head are known as loop-scavenged engines.
- The log book can be used as a reference to study previous data of machinery parameters in order to plan maintenance work more effectively.
- High vibration levels combined with the presence of water in the lubricating oil may cause damage to the bearings of the engine.
- To **damp** means to increase the amplitude of a sound source.
- You must use only pencil to fill in the log book.

