

**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.)

*uniflow cylinder elastomer contaminants compressor power loop output
vibrations flow rod scavenge coupling elastic liner motion crown*

- The presence of water and _____ in the lube oil combined with severe _____ may speed up the damage process.
- If the engine has a _____ turbine connected to its crankshaft via a reduction gear, a flexible _____ is used to compensate for the vibrations that occur during _____ transfer.
- In _____-scavenged engines, the flow of scavenging air is in one direction.
- _____-based mounting systems are used to suppress or attenuate noise and vibration in ships.
- A Helmholtz resonator lining in the _____ air pipe and/or a low noise diffuser for the turbocharger _____ may be used to reduce noise in the engine room.
- In _____-scavenged engines, the charge air passes over the piston _____ and rises to form a circle within the _____, expelling the exhaust gases through exhaust ports cut in the same side of the _____ above the scavenge ports.
- The power _____ of an engine at a given speed is proportional to the mass _____ rate of air.

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

- The position of the ship at sea, in **p**_____ or at anchorage should be noted down in the log book.
- 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 **c**_____ by blowing in fresh air.
- An electrically driven **a**_____ blower is usually installed on 2-stroke engines because the air provided at **l**_____ engine speeds is not enough.
- Unlike the 4-stroke diesel engine, the 2-stroke one does not use the **p**_____ to push out the exhaust gases.
- Any remarks for surveys and Port State Control **i**_____ must be filled in the log book.
- Velocity is the **s**_____ of something in a particular direction.
- The various diesel engines and the **p**_____ are the main sources of vibration on board ships.

3. Match the following words to their synonyms/explanations. There is one (1) extra word. (15 p.)

| | | | |
|---------------|---------------|-----------|----------|
| rectify | breakdown | fracture | cavity |
| feasible | tamper (with) | aperture | fatigue |
| objectionable | stiff | scored | align |
| mandatory | slacken | attenuate | fretting |

- wear caused by friction:.....
- make changes to something without permission:.....
- reduce the intensity or force:.....
- with deep scratches:.....
- breakage:.....
- an opening, hole or gap:.....
- correct, bring something to its former condition:.....
- obligatory:.....
- great tiredness, exhaustion:.....
- loosen:.....
- rigid, difficult or impossible to bend:.....
- sudden failure in operation:.....
- unpleasant, undesirable:.....
- arrange in a straight line:.....
- able and possible to be done:.....

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

- Vibration _____ (**measure**) should be carried out to ensure that the vibrations on board are kept within _____ (**permit**) levels.
- The _____ (**axis**) damper is fitted on the crankshaft to dampen the oscillation of the shaft in fore and aft directions.
- It is the shipyard's _____ (**responsible**) to cover the engine room walls with _____ (**absorb**) material for noise attenuation.
- It is of prime _____ (**important**) to note down the relevant information in the log book for future reference and _____ (**retrieve**).
- Any prolonged _____ (**expose**) to levels of 85 dB or above can severely affect your hearing in the _____ (**absent**) of ear protection.
- The most famous type of _____ (**torsion**) 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.
- _____ (**excite**) is the process in which an atom adopts a higher energy when energy is supplied.
- All sludge and garbage _____ (**dispose**) operations should be recorded in the log book.
- As per MAN Diesel, noise _____ (**emit**) from 2-stroke engines primarily originate from the turbocharger, exhaust valves and fuel _____ (**inject**) systems.
- Any accidents, such as _____ (**collide**) or _____ (**ground**) should be noted down in the logbook.

5. Underline the correct alternative. (20 p.)

- **Frequency/ Vibration/ Resonance/ Volume** is the vibration produced in an object vibrating at a similar frequency.
- **Bracing/ Bearing/ Arranging/ Balancing** is a way of controlling vibrations.
- The most famous type of damper consists of an inertia ring which is enclosed in a thin layer of **silicon/ silicone/ grease/ rubber**.
- **Amplitude/ Speed/ Frequency/ Velocity** is the greatest distance that a wave, especially a sound or radio wave, vibrates.
- To **dampen/ absorb/ detune/ excite** means to reduce the amplitude of a sound source.
- Slow **running/ sailing/ steaming/ operating** is the easiest way to reduce fuel oil consumption.
- Older engines were "naturally **aspirated/ scavenged/ charged/ loaded**" - taking fresh air only at atmospheric pressure.
- **Attenuation/ Natural frequency/ Resonance/ Oscillation** is the frequency at which a system oscillates when it is not subjected to a continuous or repeated external force.
- 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 **silencer/ boiler/ absorber/ scrubber**.
- **Balancers/ Dampers/ Bracings/ Shock-absorbers** transfer the rocking vibration of the engine to the hull of the ship.
- An entry for all the lube oil **resting/ remaining/ staying/ keeping** on board must be made in the engine room log book every day.
- The data from the log book is often used as evidence in case of insurance **claims/ demands/ questions/ requirements** arising after an accident.
- The purpose of the gas exchange process is to remove the burnt gases at the end of the **suction/ intake/ compression/ power** stroke and admit fresh air for the next cycle.
- Installing a permanent type vibration meter on critical machines can give us signs of wear and **fear/ fretting/ tear/ damage** to be rectified well in advance before the fault converts into an expensive problem.
- The aim of vibration analysis is to determine the **deteriorating/ normal/ optimum/ improving** condition of equipment before it leads to a breakdown.
- All important machinery parameters noted down in the log book can be compared with the design and **sea/ check/ effort/ trial** conditions at regular intervals in order to analyse the performance of engine room machinery and systems.
- The speed of the ship in **kilometers/ knots/ nautical miles/ miles** is also recorded in the log book.
- The pressurised air supplied by the turbocharger is cooled to increase its **density/ weight/ flow/ pressure** before entering the cylinder.
- The piston **crown/ pin/ skirt/ rod** of a loop-scavenged engine is longer than that of a uniflow-scavenged one.
- The twisting of one end of an object while the other end is held fixed is **oscillation/ vibration/ rotation/ torsion**.

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

- Deflection readings are taken to check the alignment of the camshaft.
- Most of the readings and entries noted down in the log book can also be taken from the control room.
- You must use only pen to fill in the log book.
- A coupling is a device used to connect two shafts together at their ends for the purpose of transmitting power.
- The fundamentals of gas exchange process in 2-stroke diesel engines are intake and exhaust.
- When the noise level is up to 80dB, the use of hearing protectors is optional.
- 2-stroke diesel engines with an exhaust valve mounted in the cylinder head are known as loop-scavenged engines.
- It makes no difference if you have the engine control room open or closed; the control room still provides the same noise insulation.
- Movement back and forth in a regular rhythm is oscillation.
- Exhaust gas driven turbochargers are used to supply the engines with fresh air at atmospheric pressure.

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

- cushion..... bolts
- generator..... operation
- holding..... tube
- preventive..... mounts
- stern..... pump
- top..... bearing
- bunkering..... set
- gudgeon..... bracing
- thrust..... maintenance
- ejector..... pin

