

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

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FINAL EXAM

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

reciprocating inertia data crankpin vibrational references

silicone excite claims integrates silicon

attenuate centrifugal misses layer natural emitted

-- The _____ from the log books is often used for insurance _____ in case of accidents, and near _____ are discussed during safety meetings as _____ that can assist in making safety plans.

-- The _____ motion of the piston in an engine cylinder creates out-of-balance forces acting along the cylinder, while the _____ force associated with the _____ rotation creates a rotating out-of-balance force.

-- The scope for reducing the source of noise _____ by a diesel engine is limited.

-- A torsional damper consists of an _____ ring added to the crankshaft enclosed in a thin _____ of highly viscous fluid, such as _____.

-- The best way of reducing engine-related noise is, naturally, to reduce the _____ energy at the source, or, if this is neither feasible nor adequate, to _____ the noise as close to its source as possible.

-- When the _____ frequency of vibration from an external source _____ with the engine vibration, the internal moving parts of the engine may be severely damaged.

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

-- _____ is the process of removing exhaust gases from the cylinder by blowing in fresh air.

-- Older engines were “naturally aspirated” – taking fresh air only at _____ pressure.

-- Modern engines make use of exhaust gas driven **t**_____ to supply pressurised fresh air. This pressurised air is then cooled to increase its **d**_____.

-- On 2-stroke engines, an electrically driven auxiliary **b**_____ is usually installed because the air provided at _____ engine speeds is not enough.

-- In **u**_____ scavenged engines, the flow of scavenging air is in one direction.

-- The _____ damper is fitted on the crankshaft of the engine to dampen the oscillation of the shaft in forward and aft directions, parallel to the shaft horizontal line.

-- In _____-scavenged engines, the charge air passes over the piston crown and rises to form a loop within the cylinder, expelling the exhaust gases.

-- **D**_____ are used to alter the frequency of the vibrating machinery reducing the vibration of the engine.

3. 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**).
- 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.
- Vibration must not result in _____ (**comfort**) and _____ (**annoy**) to the crew.
- The power output of an engine at a given speed is _____ (**proportion**) to the mass flow rate of air.
- High levels of vibration may cause _____ (**form**) or _____ (**break**) of the engine components.
- _____ (**insulate**) techniques and the prevention of local _____ (**resonant**) are used to keep the vibrations in the accommodation and at other locations within _____ (**accept**) levels.
- Any prolonged _____ (**expose**) to noise levels of 85dB or above is likely to lead to hearing _____ (**lose**) in the absence of ear _____ (**protect**). 140dB or above is likely to be physically _____ (**pain**).
- Vibration analysis can be conducted by _____ (**maintain**) engineers, who use _____ (**rely**) methods that produce written data.
- _____ (**complete**) scavenging results in poor combustion, lube oil contamination, piston ring wear, as well as high mean temperature in the cylinder.

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

above, with, up, in, at, by, through, from, to, on, within, out

- 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.
- The rate which a sound vibrates is called frequency.
- Some 2-stroke engines are fitted exhaust posts located just the scavenge ports.
- The presence of water and dirty particles in the lube oil combined with severe vibrations may speed the damage process.
- In the engine room, sound reverberates and noise is emitted other machinery, too. There are many noise transmission paths which vibrational energy is transferred one area another.
- Vibration measurements should be carried to assure that the vibration level is ISO requirements.

5. Match the following words to their synonyms. (5 p.)

erratic *aperture* *aspirate* *stiff* *align*
severe *mandatory* *resilient* *feasible* *counteract*

- difficult or impossible to bend, rigid:
- not regular, unpredictable:
- obligatory:
- make ineffective or neutralise the bad effects of sth by using an opposite force:
- an opening, hole or gap:
- able to return to an original shape after being pushed, stretched, bent, etc:
- arrange in a straight line:
- able to be achieved:
- provide an ICE with air:
- serious:

6. Fill in the gaps using the words in the list below. There are two extra words. (15 p.)

readings *mountings* *excitation* *bracing* *transmits* *neat* *coupling* *advances* *fatigue*

hull *performance* *over-writing* *efficiency* *gensets* *trial* *garbage* *sewage*

- Anti-vibration _____ mainly benefit propulsion engines, _____ and diverse auxiliary machinery, such as ventilation fans, compressors, pumps, _____ treatment plants, etc.
- _____ in engine design that aim at economy and _____ unfortunately lead to greater noise on board.
- The engineers who work in the engine room must ensure that the logbook is kept _____ and clean without oil smudges or _____.
- The _____ noted down in the logbook can be compared to the design and _____ conditions in order to analyse the _____ of engine room machinery and systems.
- In the case of a constant speed engine, a damper can also be tuned to dampen a specific _____ frequency.
- Engine _____, normally fitted on top of the engine, _____ the engine's rocking vibration to the _____ of the ship.
- High levels of vibration may cause _____ damage to the engine.

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

- flexible..... crankpin
- piston conditions
- working..... order
- firing..... seizure
- fatigue..... operation
- at any given..... inspection
- scored..... time
- PSC..... on board
- remaining..... of machinery
- bunkering..... coupling

8. Read the following article and answer the questions that follow. (10 p.)

FIRE IN THE ENGINE ROOM!

As any seafarer who has experienced it will undoubtedly agree, 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 cause is oil leaking from pipes under high pressure, specifically from the fuel pump discharge.

When a high-pressure fuel line fractures or a gland leaks, fuel oil is released as a fine spray that will readily ignite upon contact with a hot surface such as the engine exhaust. The resulting blaze is immediately fierce, and being constantly fed with fuel from the high-pressure line, will rapidly become impossible to fight with extinguishers and hoses. It will probably be necessary to evacuate the engine room within a very 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 of the high risk and severe consequences 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 from being sprayed over a hot surface and the consequent fire.

DO regularly check the fuel oil drain tank and ensure the alarm is functioning so that any leakage from the inner pipe is detected.

DO ensure that the outer protective skin of fuel oil pump discharge lines is frequently checked and immediately renewed if any damage or deterioration is found.

DO confirm that the remote stops and quick-closing valve mechanisms 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)

1. What is the most usual fire on board and how is it caused?
2. What happens when there is fuel leakage in the engine room?
3. How can you prevent a fire in the engine room from spreading to the rest of the ship?
4. Why are the fuel oil pump discharge lines double-skinned ?
5. What advice is given in the article to minimise the risk of fire in the engine room?

GOOD LUCK!!!