

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

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FINAL EXAM

1. Fill in the gaps with the right word from the list below. (15 p.)

overhauled clearances cracking injectors balancing combustion carbon

particles deflection crown stalling intervals viscosity alignment scale

- HFO cannot be pressed through the _____ without treatment. Therefore, it needs heating to decrease the _____ and purifying to eliminate water and dirt _____.
- A faulty injection pump can be the reason behind a _____ engine.
- The engine should be _____ and cleaned at regular _____.
- The piston _____ is exposed to high thermal stresses which may cause _____.
- _____ readings should be taken as per the constructor's recommendations to check the _____ of the crankshaft.
- The cylinder head should be checked at the _____ side for cracks or burning damage, and for _____ deposits at the water spaces.
- Piston rings should be checked for _____ deposits in their grooves and for proper _____.
- The used fuel is mixed with a new charge in the _____ tank.

2. Complete the text about lubrication using the words given below. (15 p.)

absorb sealing sticking task antifouling wear released moving

inadequate cooling reduce performance protects seizing tenacity

The main _____ of lubrication is to _____ friction between the _____ parts of an engine. In this way we ensure better _____ of the engine and reduction of _____. Lubrication also acts as a _____ means of the metal surfaces, as it can _____ a considerable amount of heat which is _____ from friction. It also _____ the surfaces from corrosion thanks to the good _____ lubricants have on metals. Furthermore, it assists the piston rings in _____ the combustion chamber. Finally, it keeps the metal surfaces clean due to the _____ property of the lubricating oil. _____ lubrication could lead to _____ of the bearings and _____ of the engine.

3. The following list of terms includes the most important parameters of fuel oils for diesel engines. Match the terms to the appropriate explanation. There are two extra terms. (10 p.)

ash content specific gravity cetane number hydrogen sulphide viscosity

water and sediment heating value density carbon residue flash point

pour point sulphur

- Content in water and solid particles. The higher it is, the more possible it is to cause erratic combustion and corrosion: _____
- The lowest temperature at which the fuel oil is observed to flow: _____
- An indication of the ignition quality of distillate fuels: _____
- The amount of heat given off on complete combustion of one pound of fuel: _____
- The temperature at which the fuel vapours ignite when exposed to a flame: _____
- The measure of the resistance of the fuel to movement. The higher it is, the more difficult it is for the fuel to flow: _____
- Chemical element which can be very injurious to engine parts during combustion because it changes into acid: _____
- Unburned carbon during combustion which can deposit on engine parts: _____
- Non-combustible solid material in the fuel which scratches the rubbing surfaces it comes in contact with: _____
- A measure of the density or weight of the fuel. It also serves as a rough check on viscosity, carbon content and other qualities: _____

4. Find the missing words. The first letter is given. (15 p.)

- What do marine fuels come from? From **c** _____ oil.
- Through what process are they taken? Fractional **d** _____.
- How do we call the fuels that are refined petroleum products? **D** _____ fuels.
- What is the function of the **s** _____ tank? It allows water and thick particles to sink down.
- How do we call the fuels that come from the residues of petroleum distillation? **R** _____ fuels.
- HFO is much cheaper than diesel, but it produces **s** _____ and dirtier **e** _____ gases.
- What does the booster pump do? It raises the **p** _____ of the fuel.
- The **p** _____ separates water and impurities from the fuel.
- To **o** _____ is to dismantle the parts of a machine, examine them, and repair or replace the damaged or defective ones.

5. Complete the sentences with the correct form of the words in parentheses. (10 p.)

- The _____ (**remove**) of water and foreign particles in the fuel oil is done in a _____ (**centrifuge**) separator.
- _____ (**add**) in the lubricating oil improve its quality.
- The TBN value of a lube oil eliminates the _____ (**corrode**) influence of acids.

- Most fuel _____ (**inject**) are operated hydraulically.
- HFO is more _____ (**viscosity**) than MDO.
- Chemical _____ (**stable**) is an important specification of lube oils.
- The lubrication of the cylinder liner is done _____ (**circumference**).
- Before starting any overhaul job, it is _____ (**advise**) to have the required tools, the _____ (**instruct**) manuals and some spare parts ready.

6. Match the words to their definitions/explanations below. (12 p.)

centrifuge, surplus, corrosion, dismantle, emission, defective, atomiser, sink, deformation, align, friction, insulate

out of shape, distortion:

faulty:

bring to a straight line:

oxidation leading to rust:

settle down:

rubbing between two metal surfaces:

opening through which fuel is sprayed:

discharge of gases:

disperse through outward movement:

protect against heat dispersal:

excess:

disassemble:

7. Suggest the right additive for the following problems. You can choose from the following: (8 p.)

antioxidants, corrosion inhibitors, VI improvers, wear preventers, pour point depressants, detergents, dispersants, antifoamants

Difficulty in pumping the lube oil at low temperatures: _____

Fouled surfaces: _____

Scratched cylinder liner surface: _____

Major accumulation of deposits on piston crown and cylinder liner: _____

Signs of corrosion on metal surfaces: _____

Foam in the crankcase: _____

Unstable viscosity: _____

Oxidation of oil: _____

8. Choose the correct alternative. (15 p.)

- The crosshead and the guides are lubricated by *cylinder oil / circulating lube oil / turbine oil*.
- The properties of lubricating oils are *similar to / different from* those of fuel oils.
- Viscosity is the *least / most* important property of lube oils.
- The Society of *Automotive Engines / Automotive Engineers* has classified oil viscosity from SAE 10 to SAE 250.
- SAE 10 to SAE 20 oils are very thin and are suitable for *low / high* temperatures.

-- SAE 30 to SAE 50 oils having a medium to high viscosity are *unsuitable / suitable* for diesel engines.

--The *acid / base* neutralising capacity of oil is represented by its TBN value, which indicates the oil's *residual / acid / alkaline* reserve. The *higher / lower* the TBN is, the more acid neutralising capacity the oil has.

--The higher the viscosity of a fuel oil, the *more / less* heating it needs to reduce it.

--The acronym CCAI stands for *calculated calcium aroma indication / cracked carbon atom index / calculated carbon aromaticity index*.

--The cylinder oil is drawn from the *sump / storage / drain* tank to a *small / big* service tank by separate pumps. From there, the oil is supplied to lubricators by gravity and is led through drillings onto the liner surface where grooves *distribute / attribute / divide* around the liner, and the piston *rings / rod* spread it up and down the surface of the liner.

GOOD LUCK!!!