

MERCHANT MARINE ACADEMY OF MACEDONIA
SCHOOL OF ENGINEERS

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FINAL EXAM

1. Complete the sentences with the appropriate form of the words in parentheses. (10 p.)

- Fuels that are refined petroleum products are called _____ (distil).
- Something that is brought into force or is valid is also _____ (effect).
- Incorrect _____ (inject) timing can cause lack of power, or can cause the engine to produce white smoke as there is _____ (sufficient) temperature to properly burn the fuel.
- _____ (add) in the lubricating oil improve its quality.
- The TBN value of lube oil eliminates the _____ (corrode) influence of acids.
- The centrifugal _____ (separate) removes water and _____ (impure) from the fuel.
- Empty the _____ (contain) of this box on the floor.
- Chemical stability is an important _____ (specify) of lubricating oils.

2. Fill in the gaps with a word from the list. There are two (2) extra words. (12 p.)

fuel	assembly	case	contains	stem
chamber	screwed	consists	atomisers	adjusted
holder	fitted	hollow	seat	

A fuel injector _____ of three main parts: the injector _____, the needle with its _____ and return spring, and the nozzle _____. Inside the holder there is a centrally formed cylindrical _____ where the needle stem and its return spring are _____. The nozzle assembly is _____ at the bottom of the injector holder, and it may have one or more _____ through which the _____ is sprayed into the combustion _____. The pressure chamber is a _____ space inside the assembly which ends to a tapered _____ where the injector needle ends too.

3. Complete the sentences with an appropriate word. The first letter is given. (21 p.)

- D _____ sampling is a method used primarily in the maritime industry to collect a representative fuel oil sample during the entire bunkering operation.
- The p _____ separates water and dirt particles from the fuel by means of centrifugal force.
- Water and thick particles sink down in the s _____ tank.
- Marine fuels come from c _____ oil.
- The acronym CCAI stands for Calculated C _____ Aromaticity Index.
- The b _____ tank is used to collect the recirculated fuel oil.

- Wear preventers are used to protect the engine parts from **f**_____.
- One of the objectives of lubrication is to cool the **m**_____ surfaces as lube oil can absorb a considerable amount of **h**_____.
- After the manifold is opened, the supplier hands over the emergency **s**_____ button to the vessel.
- **V**_____ is the most important property of lube oils.
- HFO is much cheaper than diesel oil, but it produces **s**_____ and dirtier exhaust gases.
- The oil is supplied to the engine at a **p**_____ of about 4 bar, and lubricates the main crankshaft **b**_____ first.

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

erosion	antifouling	insulate	manifold
scored	centrifuge	seizing	residue
particle	tenacity	distil	fouled
treatment	corrosion	bunker hose	stalling

- process for improving quality: _____
- wrap up, protect against heat or cold: _____
- reduction of revolutions, eventual stopping of the engine: _____
- sticking property, adhesion: _____
- disperse through outward movement: _____
- what remains leftover: _____
- flexible tube designed to carry marine fuel: _____
- major damage due to insufficient lubrication: _____
- tiny solid material: _____
- dirty: _____
- with deep scratches: _____
- refine: _____
- mechanical wear due to acids, rust: _____
- the fuel delivery connection: _____
- fighting dirt: _____

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

- Around the pour point, the fuel can hardly be pumped and needs heating.
- Most fuel injectors are operated hydraulically.
- The properties of lube oils are similar to those of fuel oils.
- The viscosity index indicates how stable the oil is to variations of temperature.
- The cylinder oil service tank is bigger than the cylinder oil storage tank.
- Marine diesel oil is mainly used for manoeuvring and in ECAs.
- The camshaft is lubricated by cylinder oil.
- The booster pump increases the temperature of the fuel just before it is delivered to the engine.
- Heavy fuel oil is less viscous than diesel oil.
- The higher the CCAI, the earlier the ignition takes place.
- Carbon deposits can be formed in every part of the engine.
- The fuel resists to flowing when its viscosity is low.

6. Complete the text on a typical fuel oil system using the following words. There are two (2) extra words. (12 p.)

suctions	mixing	cooler	filter	centrifuge
settling	viscosity regulator	three-way	service	regulating
sludge	non-return	heater	storage	

From the _____ tanks, the HFO is pumped into the _____ tank, where water and heavy dirt sink down. Then it is fed through a heater to a _____ where the fuel is cleaned from all foreign particles. Water and dirt go to the _____ tank. Then, the clean fuel is pumped into the HFO _____ tank. From there the fuel, after passing through the _____ tank, is pumped by booster pumps into a _____ and right after into a _____, which automatically adjusts the temperature of the fuel. Finally, the fuel is discharged through a fine _____ to the main engine fuel pump _____. A pressure _____ valve ensures a constant pressure supply to the engine-driven fuel pumps. A diesel oil tank is also installed in the system and a _____ valve allows us to change over from HFO to diesel oil whenever the vessel is about to enter an ECA.

7. The following abbreviations can be seen at different points in the fuel oil system. What do they mean? (10 p.)

-- TI:
-- VAH:
-- DAH:
-- LAL:
-- PI:

8. Circle the correct answer. (14 p.)

- Pour point --- allow the lube oil to flow at cold operating temperatures.
 - a. depressants
 - b. dispersants
 - c. improvers
- --- help to keep metal components clean.
 - a. Antifouling agents
 - b. Depressants
 - c. Detergents
- The piston --- spread the cylinder oil up and down the liner surface.
 - a. rods
 - b. rings
 - c. pins
- SAE 10 to SAE 20 oils are very --- and are unsuitable for diesel engines.
 - a. viscous
 - b. thin
 - c. thick
- The acronym SAE stands for:
 - a. Society of Automotive Engines
 - b. Society of Automotive Engineers
 - c. School of Automotive Engineers
- A --- indicator is used for monitoring filter contamination.
 - a. pressure
 - b. density
 - c. differential pressure
- --- indicates the ignition quality of diesel oil.
 - a. Carbon residue
 - b. CCAI
 - c. Cetane number
- --- shows the amount of heat given off on complete combustion of one pound of fuel.
 - a. Specific gravity
 - b. Temperature value
 - c. Heating value
- --- are used to keep particles of soot and other contaminants suspended in the oil.
 - a. Detergents
 - b. Dispersants
 - c. Depressants

-- A measure of the density or weight of the fuel is ---.

- a. density
- b. specific gravity
- c. kinematic viscosity

-- --- is indicative of the ignition delay of residual fuels.

- a. CCAI
- b. Cetane number
- c. Flash point

-- --- represents the incombustible metals present in the fuel.

- a. Ash content
- b. Acid number
- c. Carbon residue

-- The word --- shows the quality of fuel and indicates how well a fuel will burn in the cylinders.

- a. class
- b. grade
- c. index

-- The temperature at which the fuel vapours ignite when they are exposed to a flame is the --- It must be known for safe transport and storage.

- a. burning point
- b. flash point
- c. boiling point

-- --- prevent the deterioration of oil due to high operating temperatures, and also due to the presence of water, metal particles and dirt.

- a. Anti-foamants
- b. Antifouling agents
- c. Antioxidants

-- The acronym ECA stands for:

- a. Emission Control Area
- b. Exhaust Control Area
- c. Emission Carbon Area

-- While in operation, the lube oil normally passes through mechanical --- to remove solid foreign particles.

- a. seals
- b. valves
- c. filters

-- Corrosion --- reduce internal rust and corrosion on metal surfaces by forming a tenacious oil film on them.

- a. inhibitors
- b. depressants
- c. preventers

-- --- partially prevent the lube oil from becoming less viscous as the temperature increases.

- a. Pour point improvers
- b. VI preventers
- c. VI improvers

-- The crosshead and the guides are lubricated by ---.

- a. cylinder oil
- b. circulating lube oil
- c. turbine oil

