

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

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**FINAL EXAM**

**1. Complete the following guidelines on handling fuel oil using the following words: (20 p.)**

*exceed, degrade, differential, storage, overlooked, contaminated, steady, monitored, heater, ensure, efficiency, grade, rate, poor, losses, viscosity, unattended, choked, optimum, recommended*

- \_\_\_\_\_ that the correct gravity disc is used.
- Never \_\_\_\_\_ the flow \_\_\_\_\_ recommended for the centrifuge for the \_\_\_\_\_ of fuel in use. The lower the flow rate, the better the \_\_\_\_\_.
- Centrifuging is still \_\_\_\_\_ for the distillate fuels, MDO/MGO, as the fuel may be \_\_\_\_\_ in the storage tanks.
- Keep the fuel temperature about 10° C above the minimum \_\_\_\_\_ temperature, and the temperature after the final \_\_\_\_\_ 5° - 10° C above the recommended fuel injection temperature to compensate for heat \_\_\_\_\_ between heater and fuel injector.
- The temperature at the purifier should be \_\_\_\_\_ – a typical \_\_\_\_\_ temperature is 98°C. Temperatures at storage, settling and service tanks should be \_\_\_\_\_ at least twice daily. Overheating can \_\_\_\_\_ the fuel.
- The importance of operating the settling and service drain test cocks is often \_\_\_\_\_, particularly in \_\_\_\_\_ engine rooms.
- Fuel oil filters should be examined every few days in service – even if the \_\_\_\_\_ pressure gauges are normal. A filter will often allow fuel to pass, even when partially \_\_\_\_\_. It can then suddenly choke completely.
- An automatic viscometer should be in proper working order to maintain correct \_\_\_\_\_ of the fuel at the engine. Failure to do this can result in \_\_\_\_\_ combustion and even damage.

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

- Slop \_\_\_\_\_ (**sound**) is 2 metres.
- \_\_\_\_\_ (**condense**) can occur when warm air hits a cold surface.
- The ballast system improves \_\_\_\_\_ (**manoeuvre**).
- The strainer is a kind of filter, easily \_\_\_\_\_ (**detach**) and \_\_\_\_\_ (**access**).
- Ejectors are \_\_\_\_\_ (**rely**) in operation, as they don't have any \_\_\_\_\_ (**move**) parts. This is why, \_\_\_\_\_ (**maintain**) is minimal.
- The \_\_\_\_\_ (**clean**) of cooling water has to be checked.
- You have to ensure \_\_\_\_\_ (**satisfy**) lubrication from the very beginning.
- Report \_\_\_\_\_ (**ready**) of the engine to the bridge.
- Bilge water is pumped overboard, only when it is \_\_\_\_\_ (**sufficient**) clean.

- You have to obtain \_\_\_\_\_ (**permit**) from the bridge to test main engine ahead and astern on air.
- Are all main engine \_\_\_\_\_ (**cool**) and lube oil sump levels correct?
- Are minimum of two \_\_\_\_\_ (**alternate**) running and in parallel?
- Stop \_\_\_\_\_ (**add**) running generator.
- Cat fines are highly \_\_\_\_\_ (**abrade**).
- Check the \_\_\_\_\_ (**suitable**) of lube oil in the sump tank.
- Homogenisers can also deal with \_\_\_\_\_ (**compatible**) problems.
- Sulphur is very \_\_\_\_\_ (**corrode**), because it turns into sulphuric acid.

**3. Match the words from the list to their synonyms below. There are 2 extra words. (13 p.)**

*insufficient, acknowledge, optional, restrict, notify, excess, harm, notice, replenish, mandatory, contaminants, mountings, fouled, coke, wary*

cautious:

unburned carbon:

cause damage:

limit:

pollutants:

inform:

compulsory:

fittings:

cancel:

not enough:

dirty:

more than necessary:

refill:

**4. Complete the sentences with an appropriate preposition. You can choose from the following: (12 p.)**

*below to before above for out after*

- Call the Chief Engineer, if the revolutions of the main engine are \_\_\_\_\_ 90 per minute.
- Temperatures \_\_\_\_\_ pour point can result in wax formation.
- Water in the fuel should be removed \_\_\_\_\_ use.
- Solid ash should be removed \_\_\_\_\_ the widest possible extent by centrifuging, and cleaning can be improved by installing a fine filter \_\_\_\_\_ the centrifuge.
- The temperature is too high, 20 degrees \_\_\_\_\_ normal.
- The preparation \_\_\_\_\_ departure checklist must be filled in \_\_\_\_\_ commencement of stand-by.
- The level of cat fines should not exceed 15 ppm \_\_\_\_\_ the centrifuge.
- Homogenisers installed \_\_\_\_\_ the fuel centrifuge can reduce the efficiency of the centrifuge.
- The cat fines content should be reduced as much as possible, \_\_\_\_\_ the fuel oil reaches the engine.
- Change-over from HFO to MDO should be carried \_\_\_\_\_ one hour before the first manoeuvres are expected.

### 5. Choose the correct answer. (25 p.)

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

- a) CCAI                                      b) cetane number                                      c) octane number

-- The percentage of this in the fuel can be translated into a corresponding energy loss. It may cause corrosion in the fuel system.

- a) sulphur                                      b) water                                      c) vanadium

-- Governments and classification \_\_\_ have made up rules which have to comply with international SOLAS rules.

- a) societies                                      b) groups                                      c) organisations

-- They are indicators of used lubricating oils in the fuel.

- a) nickel and iron                                      b) vanadium and silicon                                      c) calcium, zinc and phosphorus

-- They are responsible for exhaust valve corrosion, known as "hot corrosion", and turbocharger deposits.

- a) aluminium and silicon                                      b) vanadium and sodium                                      c) calcium and zinc

-- A highly toxic, flammable gas. Exposure to high vapour concentrations is hazardous.

- a) sulphur                                      b) hydrogen sulphide                                      c) nitrogen dioxide

-- A measure of the fluidity of a fuel at a certain temperature.

- a) kinematic viscosity                                      b) pour point                                      c) density

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

- a) carbon residue                                      b) acid number                                      c) ash content

-- It indicates the ignition quality of distillate fuels.

- a) octane number                                      b) CCAI                                      c) cetane number

-- The bilge system is a:

- a) safety optional system                                      b) non-safety system                                      c) safety system required by law

-- It is used to indicate and assess the stability and cleanliness of a fuel.

- a) total sediment potential                                      b) carbon residue                                      c) ash content

-- The inherent ability of a fuel to protect some moving parts of fuel pumps and fuel injectors from wear.

- a) oxidation stability                                      b) specific gravity                                      c) lubricity

-- Depending on \_\_\_ and trim we choose which bilge well the water is collected in.

- a) ballast                                      b) speed                                      c) list

-- It indicates the coke-forming tendencies of a fuel.

- a) sodium                                      b) carbon residue                                      c) sediment

-- Chemical element which contributes to air pollution. Its compounds can severely damage the engine parts they come in contact with.

- a) sulphur                                      b) sodium                                      c) vanadium

-- A cleaning apparatus which separates oil from bilge water before it is pumped overboard.

- a) purifier                                      b) oily water separator                                      c) strainer

-- The lowest temperature at which the fuel is observed to flow.

- a) cloud point                                      b) flash point                                      c) pour point

-- It is important for the onboard purification of the fuel. It is also used to convert volume to weight.

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

-- It must be known for safe transport and storage and is set at 60° C (minimum value) as per SOLAS regulations.

- a) flash point                                      b) melting point                                      c) boiling point

-- They indicate the presence of tiny particles of aluminium and silicon used in the refining process and carried over into the residual fuels.

- a) acids                                      b) cat fines                                      c) sediments

-- In the bilge system, all suction lines are fitted with \_\_\_ valves which do not allow the liquid to flow back to the bilge well.

- a) non-return                                      b) safety                                      c) throttle

- An extremely large tank where the bilge water is pumped into from the bilge well.  
 a) sludge tank                                      b) holding tank                                      c) drain tank
- A pumping device which, in cases of emergency, discharges the bilge water right overboard.  
 a) air pump    b) general service pump                                      c) ejector
- The \_\_\_ box is a kind of filter on the suction line head which prevents solid particles from entering the pumps and choking them.  
 a) mud    b) filter    c) sludge
- The \_\_\_ is situated in the engine room and runs from the distribution valve chest to the suction side of the bilge pumps.  
 a) sea water line                                      b) suction line    c) main bilge line

**6. You will read an article about the ballast system. Ten phrases have been extracted from the article. Write the correct number in front of the phrases. (10 p.)**

- implement the regulations within their waters
- pump ballast water into dedicated cargo spaces to add extra weight
- the propeller to be submerged ensuring
- the ship down and lowers her centre
- for ships to collect a large quantity of sediment in the period between
- improving fuel efficiency by as much as 5%
- be constructed to withstand certain kinds
- the tanks on the starboard side and the other
- carry out repairs to the hull while still afloat
- the outboard area from keel

When a ship is sailing in empty or part laden condition, her ballast water treatment system allows ...[1]... more efficient use of the ship's engine. Even when ships are in a loaded condition, small amounts of ballast can be used to ensure optimum trim ...[2]... if the conclusions of developers of trim optimisation software are accurate.

Ballast is also used for other operational reasons on occasions and in special circumstances. Examples include maintaining optimum distances between loading and discharging apparatus such as conveyor belts, altering the trim of a ship to ...[3]... and carrying out similar actions to raise breaches of the hull above the waterline after a collision or other cause of damage.

To provide adequate stability to vessels at sea, ballast weighs ...[4]... of gravity. International agreements under the **Safety Of Life At Sea (SOLAS) Convention** require that cargo vessels and passenger ships must ...[5]... of damage. The criteria specify the separation of compartments within the vessel, and the subdivision of those compartments. These International agreements rely on the states that signed the agreement to ...[6]... and on vessels entitled to fly their flag. The ballast is generally seawater, pumped into ballast tanks. Depending on the type of vessel, the tanks can be double bottom (extending across the breadth of the vessel), wing tanks (located on ...[7]... to deck) or hopper tanks (occupying the upper corner section between hull and main deck). These ballast tanks are connected to pumps that pump water in or out. Depending on ship size and type, the number of pumps may vary. Large vessels usually have two. These pumps can generally handle all tanks but commonly one serves ...[8]... the port side tanks, except in times of need or breakdown.

Crews fill these tanks to add weight to the ship and improve her stability when she is not carrying cargo. In extreme conditions, crews may ...[9]... during heavy weather or to pass under low bridges.

Filtration of ballast water where no treatment system is fitted can be quite rudimentary and it is not uncommon ...[10]... dry-dockings or ballast tank cleaning. Sediment is undesirable as it reduces the

earning capacity of the ship and constant movement of larger material can cause damage and wasting of the tanks. It also provides a fertile breeding ground for invasive species.

(Retrieved: 19 June, 2020 from [www.shipinsight.com](http://www.shipinsight.com))

***GOOD LUCK!!!***