

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

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Exam paper grade:

Name:

Student number:

Date:

FINAL EXAM

1. Fill in the gaps with a word from the list. There are two extra words. (15 p.)

ballast fuel trim choking corrosive drydocking water permission solid

wells incompatibility list pressure homogenisers vacuum counteracted air

- The _____ effect of sulphuric acid is _____ by adequate lubrication.
- Bilge _____ are always provided with strainers to prevent _____ particles from entering the bilge pump and _____ it.
- An ejector creates a _____ by the speed of the _____ flowing through it.
- The use of _____ is a good way to deal with _____ problems.
- You should obtain _____ from the bridge to test main engine ahead and astern on _____.
- During a _____ operation at night, while at a shipyard in order to _____ the vessel for _____, it was discovered that the engine room was flooded.
- An anti-heeling system is used to minimise the _____ of the vessel in port.

2. Fill in the gaps with a suitable word. The first letter is given. (15 p.)

- Present **o** _____ of the main engine is 1,000 KW.
- The engine must be warmed up gradually by means of the circulating **p** _____.
- Present **p** _____ of propeller is 90 degrees.
- Do not exceed a **p** _____ of 4 bars.
- Present **r** _____ of the main engine are 100 per minute.
- **C** _____ over to high sea suction from low sea suction.
- When you turn the engine with the turning **g** _____, the indicator cocks must be open.
- Make an examination inside the **c** _____ to make sure than no tools, cleaning rags or bars have been left inside.
- Do not exceed a minimum **t** _____ of 20 degrees centigrade.
- Slop **s** _____ is 2 metres.
- Are air start **c** _____ running and set on auto start (where applicable)?
- **W** _____ may cause corrosion in the fuel system.

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

- Ejectors are simple in design and _____ (**rely**) in operation and due to their excellent suction _____ (**capable**) they are frequently used for various marine _____ (**apply**).

- You should check the _____ (**suitable**) of lube oil in the sump tank on a regular basis.
- CCAI 860 is _____ (**accept**) for slow speed engines.
- There was fast _____ (**deteriorate**) of the valve seats.
- Bilge water is not _____ (**exact**) water but a _____ (**mix**) or _____ (**vary**) of substances.
- Homogenisers installed before the fuel centrifuge can reduce the _____ (**efficient**) of the centrifuge and thus, the _____ (**clean**) of the fuel delivered to the engine.
- Ash is a solid _____ (**contaminate**) in the fuel.
- _____ (**impure**) in the fuel can cause damage to the fuel pumps.
- According to MARPOL _____ (**regulate**), bilge water must first pass through an _____ (**oil**) water separator before being discharged overboard.
- Cat fines can be very _____ (**harm**) to the engine components.
- A bilge well is the most important _____ (**residue**) collection tank of the entire engine room.
- They use _____ (**add**) to improve lube oil quality and reduce the possibility of salt water _____ (**contaminate**).
- N/A in the checklist stands for *not* _____ (**apply**).

4. Match the following words to their synonyms/definitions. (10 p.)

replenish alter wear and tear condensation comply with

dismantle contaminate trim accumulate sounding

- obey a rule.....
- pollute.....
- refill.....
- gradually increase in quantity over a period of time.....
- damage due to continuous use.....
- the process for calculating the total quantity of fluid in a tank.....
- take apart, disassemble.....
- change.....
- the difference between the fore and aft draughts.....
- the process of steam or warm air changing to liquid.....

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

to in on through with back above up from out by

- All suction lines are fitted with non-return valves which do not allow the liquid to flow _____ to the bilge well.
- The temperature is too high. It is 20 degrees _____ normal.
- The cargo holds are usually provided _____ four bilge wells.
- Bilge wells are periodically emptied _____ pumping out the bilge with the help of bilge pumps.
- The preparation for departure checklist must be filled _____ prior _____ commencement of stand-by.
- Warm _____ the engine gradually.
- Decide whether the harbour manoeuvres should be carried _____ on diesel oil or on heavy fuel oil.

- We have to transfer water _____ No 2 tank _____ No 4 tank.
- Fuel is known to form deposits _____ hot spots, i.e. in the piston undercrown space.
- Some cylinder oil may leak _____ the stuffing box, down into the system lube oil sump.
- Depending _____ list and trim we choose which bilge well the water is collected _____.
- The piston rod stuffing box separates the combustion and scavenge air spaces _____ the crankcase.

6. Match the following parameters tested in marine fuels to their definitions / explanations. There are two extra terms. (15 p.)

flash point hydrogen sulphide heating value cetane index carbon residue
used lubricating oils sulphur ash acid number CCAI pour point
density kinematic viscosity cat fines base number total sediment potential
water

- The percentage of this in the fuel can be translated into a corresponding energy loss. It may also cause corrosion in the fuel system. _____
- It contributes to air pollution. Its compounds can corrode cylinder liners and piston rings. _____
- They indicate the presence of tiny particles of the catalyst used in the refining process and carried over into the residual fuel. _____
- It is used to indicate and assess the stability and cleanliness of a fuel. _____
- It mainly affects fuel separation. It is used to convert volume to weight. _____
- The amount of heat given off on complete combustion of one pound of fuel. _____
- It indicates the tendency of a fuel to form coke. _____
- Calcium, zinc and phosphorous are considered “fingerprint” elements of these. _____
- It is expressed in degrees centigrade; it must be known for safe transport and storage. _____
- It represents the incombustible components present in a fuel oil. _____
- A highly toxic, flammable gas which can be fatal in extreme cases. _____
- It is indicative of the ignition quality of a residual fuel oil. _____
- A measure of the fluidity of a fuel at a certain temperature. _____
- An indication of the ignition quality of distillate fuels. _____
- It detects all acids present and if it is increased, it may indicate other harmful substances. _____

7. Match the questions to the answers. There is an extra question. (10 p.)

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|---|---|
| 1. Which fuel can cause combustion deposits, especially when the engines run at low load? | -- Viscosity. |
| 2. What causes fouling of the gasways? | -- Special lubricants with high TBN. |
| 3. Which solid particles are particularly responsible for abrasive wear? | -- Ash. |
| 4. Which parameter is not actually a measurement of HFO quality? | -- Fuel oil with high carbon residue. |
| 5. What do engines designed for operation on high sulphur fuels use to minimise the effects of sulphur? | -- By centrifuging and a fine filter. |
| 6. Which areas will suffer high wear if cat fines rates are not reduced? | -- Carbon residue. |
| 7. How can you remove cat fines? | -- Fuel pumps and injectors, the liners and piston rings. |
| 8. What can replace the traditional cylinder oil? | -- The pour point. |
| 9. How can you remove vanadium deposits from the turbocharger nozzle ring? | -- Cat fines. |
| 10. Which fuel property determines the requirements for tank heating and transferring? | -- Blended lube oil. |
| 11. Which parameter represents the incombustible components of fuel oil? | |

GOOD LUCK!!!