

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

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FINAL EXAM

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

- The valve to starting air _____ (**distribute**) is closed.
- _____ (**abrade**) wear is sometimes caused by _____ (**catalyst**) fines.
- The _____ (**dry**) removes any moisture from the refrigerant.
- _____ (**sulphur**) acid is formed due to the absorption of _____ (**condense**) or moisture present in the combustion chamber.
- In reefer ships, the temperature of the _____ (**perish**) cargo is controlled by the refrigeration plant.
- _____ (**pure**) in the fuel oil may cause scratches.
- _____ (**friction**) wear takes place between the cylinder liner and piston rings.
- _____ (**form**) of piston rings and _____ (**align**) may cause cylinder oil film deficiencies.
- The rapid _____ (**grow**) of piracy attacks in Somali waters is connected to political _____ (**stable**) in the area.
- _____ (**remove**) insulation is recommended in this case.
- Heat _____ (**lose**) may be reduced _____ (**consider**) with proper insulation.
- There are _____ (**axis**) marks on the liner surface. They are due to _____ (**sufficiency**) lubrication or _____ (**exceed**) loading.
- One way of monitoring the condition of the cylinder liner is checking its _____ (**oval**).

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

- What is the pumping **p**_____?
- Different solenoid valves control the **f**_____ of the refrigerant into the cargo hold.
- COW stands for **C**_____ **O**il **W**_____.
- The **b**_____ of a diesel engine cylinder describes the inside diameter of the cylinder.
- Wear **r**_____ is a measurement of the speed at which wear happens.
- The **e**_____ unit acts as a heat exchanger to cool down the cargo hold.
- Is the **i**_____ gas system operational?
- The cetane number of a diesel fuel indicates its **i**_____ quality.
- **C**_____ is the most effective way of removing water and dirty particles from fuels.

3. Put an appropriate word from the list in the gaps that follow. There are two extra words. (15 p.)

condition outlawing finish ingress alloy elbow rigid cold circuits

charge substitutes comply alterations implemented alternative inerted flexible

- Are your tanks _____?
- Cylinder liners are fabricated from a cast iron _____.
- Cylinder liner wear can be minimised by avoiding any _____ of moisture from the _____ air.
- New engines must now _____ with the Tier II NO_x regulations.
- Since the _____ of asbestos, _____ insulation materials had to be found and adopted as _____.
- A _____-monitoring programme should be _____ in order to face the issue of _____ corrosion.
- The control unit consists of different safety and operating _____ for the safe operation of the reefer plant.
- Insulation is available in various forms, depending on the product, such as _____ blanket, and preformed pipe and _____ sections.
- Scuffing causes polishing of the metal surface, which gives liners a mirror _____.

4. Choose the correct answer. (15 p.)

- Diesel engine lube oil diluted with diesel fuel oil is indicated by:
a. decreased viscosity b. decreased pour point c. increased flash point
d. increased viscosity

- If the analysis of used lube oil indicates a high content of iron particles, this could indicate:
a. excessive ring and liner wear b. excessive cooling of lubricating oil
c. corrosive deterioration of a bearing d. inadequate air filtration

- “Loop”, “uniflow”, “cross flow” are terms used to describe various types of:
a. scavenging b. turbochargers c. control air circuits d. supercharging

- The possibility of damage from operating a diesel engine at critical speeds is reduced by the use of:
a. a vibration damper b. an isochronous governor c. elastic engine mounts
d. a cast iron bedplate with good flexible qualities

- What occurs in the combustion space of a diesel engine cylinder shortly after ignition and before the piston reaches TDC?
a. rapid increase in pressure and temperature
b. rapid increase in volume and decrease in pressure
c. rapid increase in temperature with constant pressure
d. rapid increase in pressure with constant temperature

- Which of the following operations will have a direct impact on the rate of wear in a cylinder liner?
a. temperature of the scavenging air b. compression ratio of the piston
c. quality of fuel injected d. amount of scavenge air in the cylinder

- Whether using a centrifuge or a simple filter, oil cleaning and filtration will be the most effective when the oil is at a:
 - a. low temperature and a high viscosity
 - b. low temperature and a low viscosity
 - c. high temperature and a high viscosity
 - d. high temperature and a low viscosity

- A viscous damper is a sealed precision-built device which dampens the torsional vibrations in the:
 - a. camshaft
 - b. thrust shaft
 - c. flywheel
 - d. crankshaft

- A diesel engine is supercharged in order to:
 - a. increase the no-load rpm's
 - b. provide more fuel for combining with the air
 - c. lower the no-load rpm's
 - d. provide more air for combining with the fuel

- Combustion knock will most likely occur as a result of using a fuel with:
 - a. low ignition quality
 - b. high volatility
 - c. low ignition delay
 - d. a high cetane number

- In a diesel engine, pistons are connected to the crankshaft with:
 - a. piston guides
 - b. connecting rods
 - c. lash adjusters
 - d. piston rods

- A diesel engine which is rated for normal operation at a crankshaft speed of 800 rpm is commonly classed as:
 - a. slow-speed
 - b. medium-speed
 - c. high-speed
 - d. constant-speed

- A centrifuge will satisfactorily remove ___ from fuel oil.
 - a. gasoline
 - b. water
 - c. lube oil
 - d. sulphur compounds

- A scored diesel engine cylinder liner will cause:
 - a. rapid wear of piston rings
 - b. combustion gases in the cooling water
 - c. high firing pressure
 - d. abnormally high cooling water temperature

- Burning fuel with a high sulphur content in a diesel engine will:
 - a. cause clogging of the fuel system
 - b. increase thermal efficiency
 - c. increase the ability of the engine to start in cold weather
 - d. produce corrosion in the cylinder and exhaust systems at low loads

5. Match the words from the list to their synonyms/definitions below. There is one extra word. (10 p.)

sluggishness orifice dilute faltering downtime stalling
composite volatility cladding fouled splinter

- time during which a machine is out of order.....
- dirty.....
- slow motion, idleness.....
- the property of changing readily from liquid to vapour/gas.....
- make a liquid thinner by adding water or other solvent.....
- a covering of hard material, used as protection.....
- break into small, sharp pieces.....
- made up of several parts or elements.....
- irregular running of the engine.....
- opening, aperture.....

6. Complete the sentences with an appropriate preposition. There are 2 extra prepositions. You can choose from the following: (15 p.)

in, at, on, to, over, out, with, before, between, by, below, up

- Spillage stopped and cleaned _____.
- Spill waste has been contained _____ save-alls.
- You have to keep contact _____ the oil terminal _____ VHF Ch.14.
- The liner should be gauged _____ regular intervals.
- Pump _____ ballast tank No 2.
- If lube oil is diluted _____ fuel oil, we have a decrease in its flash point.
- HFO has to be heated prior _____ centrifuging.
- High liner wear will cause increased blow-_____.
- Most types of cylinder liner wear take place _____ the piston rings and the liner.
- Even engines operating _____ low sulphur fuels may be prone _____ scuffing damage.
- The liner has to be cleaned and inspected _____ gauging.
- One of the main purposes of a ship's refrigeration is to keep cargo _____ good condition.
- Permanent insulation is cut and fitted _____ site.

7. You will read an article about safe fuel changeover. Ten phrases have been extracted from the article. Write the correct number in front of the phrases. (10 p.)

- | | |
|--|--|
| ---sufficient time for the fuel system to be flushed | ---sufficiently alkaline |
| ---when fuels may mix | ---when entering and leaving |
| ---ensure that the optimum viscosity | ---a lower base number (BN) |
| ---temperature change of 2°C per minute | ---of grounding or collision |
| ---can be carried out on board | ---of thermal shock to engine components |

ExxonMobil has issued fuel-switching tips for vessels entering and leaving ECAs

ExxonMobil has compiled five ‘top tips’ to help vessel operators switch fuels effectively ... [1]... emission control areas (ECAs) without introducing maintenance problems.

Typically, inadequate management of the fuel switch-over process can increase the risk ...[2]..., which can result in fuel pump seizures and engine shut-downs.

ExxonMobil advises marine operators to consider the following key tips:

- Have a clear switch-over procedure. It is important to ensure that the crew is familiar with the process. As an additional safety measure, the procedure should be tested prior to entering crowded and restricted channels where there is a higher risk ...[3]...
- Outline the best time to switch over. The optimal switch-over period is different for each vessel and operators must allow ...[4]... of all non-compliant fuel before arriving at an ECA limit.
- Avoid hazards; know the correct temperature and viscosity. The viscosity of heavy fuel oil (HFO), ECA fuels and marine gas oil (MGO) are very different. The appropriate temperature must be achieved to ...[5]... at the injectors is reached. HFO is injected at ~130°C and MGO needs to be cooled to ~30°C in order to reach the correct viscosity. Major engine manufacturers typically recommend a maximum ...[6]... to help avoid thermal shock.
- Understand compatibility. There is a risk of fuel incompatibility during the switching process ...[7].... This may clog filters, causing engine starvation and possible shut-down. In order to understand if fuels are compatible, an industry-standard spot test ...[8]... or a more thorough compatibility test can be requested from a reputable testing laboratory.
- Choose the correct lubricant. Cylinder oils need to be ...[9]... to neutralise any corrosive acidic sulphur in the fuel. However, when less sulphur is present, less sulphuric acid is produced. Too much alkalinity in the cylinder oil can lead to liner wear, while too little increases the risk of acid corrosion. When burning low sulphur fuels in slow speed engines, it is recommended that ...[10]... lubricant should be used.

(Retrieved: 23 June, 2016 from www.mpropulsion.com)

GOOD LUCK!!!