MERCHANT MARINE ACADEMY OF MACEDONIA
SCHOOL OF ENGINEERS

Course: Maritime English
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Instructor: A. Birbili **Exam paper grade:**
Name:
Student number:

FINAL EXAM

A. Fill in the gaps using the words below. There are two extra words. (15 p.)

deflections wear acids centrifuging particles pour point boilers fines high alignment abrasion sulphur flash point low clarifiers effect transfer

-- The presence of _____ in the fuel leads to the formation of sulphuric _____ which in turn lead to _____ temperature corrosion of the cylinder liners, exhaust systems and exhaust gas _____, unless special measures are taken to reduce their _____.
-- Cylinder liner _____ is caused mainly by friction, _____ and corrosion.
-- It is important to measure crankshaft _____ at regular intervals to ensure that the _____ of the shaft is within permissible limits.
-- Catalytic _____ give rise to abrasive wear and their content should be reduced as much as possible by _____ the fuel oil before it reaches the engine.
-- The _____ of a fuel oil determines the requirements for tank heating and for the arrangement of fuel _____ piping.
-- Improved _____ with automatic desludging provide adequate separation of water and _____ from the fuel, up to a density of 1010 kg/m^3 at 15^o Celsius.

B. Complete the sentences with the appropriate form of the words given. (15 p.)
-- Wartsila aims to apply its _____ **(extend)** experience in dual-fuel power to 2-stroke engines.
-- The systematic variation in _____ **(alkaline)** may produce uneven _____ **(corrode)** wear on the cylinder wall.
-- Marine fuel oils should be thoroughly cleaned to remove solid and liquid _____ **(contaminate)**.
-- As heavy fuel oil is more _____ **(viscosity)** than marine diesel oil, it cannot be pressed through the injectors without proper _____ **(treat)**.
-- Fuel efficiency and environmental _____ **(friendly)** are high on the list of requirements for ship _____ **(propel)** engines from today's shipping and shipbuilding industries.

-- Owners and operators are taking _____ **(decide)** now on how they will meet the financial and _____ **(comply)** challenges.
-- Fuels which are produced on the basis of different crude oils tend to be _____ **(stability)** when mixed.
-- Heavy fuels, which consist mainly of the _____ **(residue)** oils remaining after the _____ **(fraction)** distillation process for other petroleum products, are likely to remain comparatively inexpensive.
-- Whatever the advantages of LNG as bunker fuel, _____ **(available)** of gas is seen as a key issue – if ships cannot bunker LNG where and when it is needed, there will be no incentive to take up this _____ **(opt)**.

C. Fill in the gaps using the words below. There are two extra words. (15 p.)

viscosity *bent* *incompatible* *crankwebs* *refined* *overcooled* *flow*

gauge *degree* *pour point* *sludge* *efficiency* *dew point* *fatigue*

stratification *crankpins* *constituents*

-- Over a period of time, as the engine keeps running, the crankshaft will not remain in the initial straight line but it will get _____ either upwards or downwards to a slight _____ which may not be visible with the naked eye but could be sufficient to cause dangerous levels of _____ in the crankwebs.
-- Although two fuel oils may have the same _____ figure, the lowest temperature at which they will _____ can be very different because it depends on the _____ of the fuel oils and the types of crude oils from which they are _____.
-- A dial _____ is inserted between the _____ to find out the distance between them.
-- A mixture of _____ fuels may lead to _____ in the storage tanks and settling tanks, and also result in rather large amounts of _____ being taken out by the centrifuges.
-- The _____ of sulphuric acid should be avoided by making sure that fuel injectors, cylinder liners and exhaust systems are not _____, although this could reduce the thermal _____ of the engine.

D. When assessing the quality of a fuel, you must take into consideration a large number of standard properties that will determine its grade. Supply the term that matches the meaning of the following definitions/explanations of the most important parameters of fuel oils. (15 p.)

-- 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: _____

-- 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 the fuel: _____
-- 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: _____

E. Choose the correct option. (5 p.)

-- LNG, as compared to HSFO, emits 99% less harmful ___ and provides a 20% reduction in greenhouse gases from the vessel stack.
a. parts b. particulates c. particles

-- For efficient removal of water by means of a conventional purifier, the correct choice of ___ disc is of paramount importance.
a. weight b. volume c. gravity

-- The acronym CFPP stands for :
a. cold filter plugging point
b. carbon filter plugging point
c. cold filter petroleum point

-- The ___ the CCAI, the later the ignition takes place.
a. higher b. lower c. clearer

-- The element which causes oxidation to the engine is ___.
a. carbon b. silicon c. sulphur

-- In actual practice crankshaft deflection readings should be taken at ___ different positions of the crankshaft.
a. three b. five c. four

-- Hard particles which are caught between the upper horizontal ring/groove surfaces will cause ___.
a. peeling b. punching c. pitting

-- Abrasive cylinder wear can be caused by hard ___ which enter the cylinder via the fuel oil and/or air or it may be the result of scuffing.
a. particles b. parts c. particulates

-- The acronym CCAI stands for:
a. calculated calcium aromaticity indication
b. cracked carbon aromaticity index
c. calculated carbon aromaticity index

-- As gas fuel enters the combustion space and mixes with the combustion air, there is a risk of uncontrolled combustion called ___.
a. blowing b. knocking c. hitting

F. Match the words to their definitions. There is one extra word. (10 p.)

provided that *consequently* *negligible* *melting point* *dismantle*

ease off *neutralise* *catalyst* *contaminate* *detrimental* *congeal*

-- a substance which, without itself changing, quickens chemical processes …….
-- the temperature at which a particular solid melts ……..
-- solidify/clot ……..
-- take apart, disassemble ……..
-- as a result ……
-- harmful ……..
-- too insignificant to be worth any attention ……..
-- make impure by mixing in dirty matter ……..
-- make ineffective, with no result ……..
-- become or make less severe …….

G. Match the words to their opposites. There is one extra word. (10 p.)

forbid *regular* *inflammable* *loose* *slow* *simple*

unlimited *transverse* *soft* *lose* *insufficient*

-- restricted ……
-- complicated ……..
-- incombustible ……
-- longitudinal ……
-- allow ……
-- adequate ……
-- rough ……..
-- tight ……
-- rapid ……
-- uneven ……..

H. Read the following article and answer the questions that follow. (15 p.)

If you want to comply with the EU legislation on sulphur emissions, you need to start acting.

Sulphur is causing a lot of harm, not only to the environment but also to our health. So there is a reason why decision-makers in Brussels are keen on acting.

The next milestone is coming up fast – the EU directive on sulphur states that from January 2015, ships sailing in so called ECAs cannot use fuel containing more than 0.1% sulphur by weight. Next up is 2020, when lower limits in EU waters outside the

ECAs will come into force. IMO's regulations on cutting sulphur content to 0.5% on a global level comes into force by 2025 at the latest, affecting practically all vessels worldwide.

Ship owners basically have two options: switch to cleaner fuel or get rid of the sulphur using scrubbers. The first option means switching to low-sulphur fuel or converting to LNG. Opting for low-sulphur fuel involves high operation costs although the switch itself is not a big investment. Switching to LNG has other environmental benefits and significantly reduces NOx emissions and particulates. But it comes with a heavier price tag. A less costly alternative for now is installing exhaust gas cleaning systems, which also offer a typical payback time of three years, depending on operational profile and trading pattern within the ECAs.

"Installing scrubbers has the lowest lifecycle cost. And with a suitable system the vessel can operate in all corners of the world," says Aslak Suopanki, Senior Technical Manager and Wärtsilä's expert on scrubbers.

Wärtsilä has been developing scrubbers for almost 10 years, and further strengthened its offering with the Hamworthy acquisition in 2012. Today Wärtsilä is the market leader with more than a hundred scrubbers sold or on order for over 50 vessels.

Wärtsilä's scrubber systems are compact in size and can be easily retrofitted. With the proper planning and engineering, the installation can be done fairly quickly. The vessel is out of service for no more than a few weeks.

So complying with new legislation on sulphur oxide is not such a big deal after all. Still, a lot of ship owners are dragging their heels.

"Ship owners generally are not too well prepared in regards to the new legislation. Retrofitting scrubbers is a big investment for any ship owner. A lot of ship owners are choosing to wait and see what happens on the market before making this decision," says Kullas-Nyman.

There is always the option of not doing anything, of course – it is still unclear what kind of sanctions await those who fail to comply. One thing is for sure, though: the environment won't be applauding the decision. And neither will our lungs.

(Retrieved: 28 May, 2015 from www.wartsila.com)

1. When will IMO's regulations on sulphur content concerning the whole globe come into force?
2. What does "switching to cleaner fuel" mean?
3. What are the advantages and disadvantages of LNG as bunker fuel?
4. What are the advantages of scrubber systems over the other alternatives mentioned in the article?
5. What are the reasons behind ship owners' unwillingness to comply with the new legislation?

GOOD LUCK!!!