

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

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Name:

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FINAL EXAM

A. Fill in the gaps using the words below. (15 p.)

solution attach indicator combustion coat frictional assessed bores

infrastructure fastened uncontrolled sliding athwartship rough turning

-- _____ the joint surfaces with permatex or a similar liquid sealing compound.

-- _____ wear takes place between the _____ surface of the cylinder liner and the piston rings.

-- Special tools should be _____ in the engine room, close to the area of application.

-- A _____ grindstone held in hand can be used to scratch over any marks on the cylinder liner.

-- Mount the non-return valves for cylinder lubrication in the _____ of the liner.

-- As gas fuel enters the _____ space and mixes with air, there is a risk of _____ combustion called “knocking”.

-- Before engaging the _____ gear, check that the starting air supply is shut off and that the _____ cocks are open.

-- Using an inside micrometer take measurements in the fore-and-aft and _____ directions.

-- As a _____ in its relative infancy, it is of little surprise to find that the _____ for LNG bunkering is still very much under development.

-- _____ the crane to the lifting crossbar.

-- The condition of the cylinder liner should be checked and _____ as per the manufacturer’s instructions.

B. Complete the sentences with the appropriate form of the words given. (15 p.)

-- All major _____ (**supply**) of fuels to the marine market are aware of and understand _____ (**compatible**) and blending problems.

-- The ability to separate _____ (**abrade**) particles depends on the size and specific gravity of the smallest _____ (**pure**) that are to be removed.

-- _____ (**sufficient**) heated fuel can result in poor _____ (**atomiser**) and delayed burning, which may lead to higher thermal loading, scuffing problems, possible piston and piston rings _____ (**fail**), and to an increase in fuel consumption.

- The systematic variation in _____ (**alkaline**) may produce uneven _____ (**corrode**) wear on the cylinder wall.
- Fuel efficiency and environmental _____ (**friendly**) are high on the list of _____ (**require**) for ship _____ (**propel**) engines from today's shipping and shipbuilding industries.
- 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**).
- Let me give you my _____ (**assure**) that the work will be finished by the agreed date.

C. Fill in the gaps using the words below. (15 p.)

*ideally gauge actual point total intervals result connecting rod
load distance factors bottom deflection alignment punch*

Crankshaft deflections should be measured at regular _____ to ensure that the _____ of the shaft is within permissible limits. A dial _____ is inserted between the crankwebs to find out the _____ between them. If the _____ is measured after the specified interval, it is necessary that it is taken at the same _____ otherwise the reading will not give a real _____ concerning the degree of deflection. Normally, a centre _____ is used to make markings so that each time the deflection is taken at the same point. Apart from using the same point on the crankwebs for measuring deflection, there are other _____ which need to be kept in mind and these include _____ on the ship, trim, hog, sag etc. _____, deflections need to be taken at four (4) points of the crank namely top, _____ and the two sides. In _____ practice, however, the bottom reading is not taken due to chances of obstruction by the _____ and instead reading is taken on both sides of the bottom position, thereby, in _____ five (5) readings are taken from each crankweb.

D. Choose the correct alternative. (5 p.)

- Attention should be drawn to the danger of fire when using paints and solvents with a low **pour / flash** point.
- For efficient removal of water by means of a conventional purifier, the correct choice of **weight / gravity** disc is of paramount importance.
- LNG, as compared to HSFO, emits 99% less harmful **particulates / parts** and provides a 20% reduction in greenhouse gases from the vessel stack.
- Hard particles which are caught between the upper horizontal ring/groove surfaces can cause **pitting / peeling**.
- All spare parts should be protected against **corrosion / erosion** and mechanical damage.
- The element which causes oxidation to the engine is **silicon / sulphur**.
- The acronym CCAI stands for Calculated **Carbon / Calcium** Aromaticity Index.

- The removal of fuel valves may cause oil to run down onto the piston **crown / skirt**.
- The acronym CFPP stands for Cold Filter **Petroleum / Plugging** Point.
- Before entering the crankcase, always ensure that the **steering / turning** gear is engaged.

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

conventional *idle (engine)* *legislation* *optimise* *swarf*
wake *clamp* *tolerance* *partition (v)* *enhance* *grit*

- improve
- a device that holds or presses parts together
- the permissible variation in some measurements or other characteristics of an object
- set of laws
- following accepted customs and standards without originality
- material such as metallic particles removed by a cutting or grinding tool
- make as perfect or as effective as possible
- divide into two or more parts
- run slowly so that power is not used for useful work
- the track left by a moving ship in water

F. Match the terms concerning the marine fuel properties to their definitions/explanations. (15 p.)

density *kinematic viscosity* *cat fines* *water* *total sediment aged* *CCAI*
lubricity *hydrogen sulphide* *sulphur* *cloud point* *cetane index*
used lubricating oils *heating value* *oxidation stability* *ash*

- It mainly affects fuel separation. It is used to convert volume to weight. _____
- The temperature at which wax begins to crystallise from a distillate fuel. _____
- The percentage of this in the fuel can be translated into a corresponding energy loss. It may also cause corrosion in the fuel system. _____
- The inherent ability of the fuel to protect some moving parts of fuel pumps and injectors from wear. _____
- Calcium, zinc and phosphorous are considered “fingerprint” elements of these. _____
- A measure of the tendency of a fuel to form sludge and acid products due to oxidation. _____
- It represents the incombustible metals present in a fuel. _____
- A highly toxic, flammable gas which can be fatal in extreme cases. _____
- Chemical element which can be very injurious to engine parts during combustion because it changes into acid: _____
- They indicate the presence of tiny particles of aluminium and silicon used in the refining process and carried over into the residual fuel. _____

- The amount of coagulated organic material that can be formed under normal storage conditions. _____
- It is indicative of the ignition delay 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. _____
- The amount of heat given off on complete combustion of one pound of fuel: _____

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

unlimited transverse soft lose insufficient

forbid regular inflammable loose slow simple

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

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

IMO issues draft fuel use data regulation

Wed 27 Apr 2016, by Paul Gunton

IMO has circulated draft amendments today (27 April) to MARPOL’s Annex VI – which deals with air pollution – to include requirements to collect data on fuel consumption. The amendments were agreed on 22 April at the end of last week’s 69th meeting of the Marine Environment Protection Committee (MEPC 69). They are expected to be adopted at MEPC 70 in October.

The requirements form a new regulation that will apply to all ships of 5,000gt and above, obliging them to record a variety of data about the ship including the power output of its main and auxiliary engines, the distance travelled from berth to berth on a voyage and the corresponding fuel consumption in tonnes.

This data must be aggregated and reported to the ship’s administration within three months after the end of each calendar year while the raw data must be kept readily available for not less than 12 months from the end of the most recent calendar year.

Administrations will issue a statement of compliance to the ship and will have to pass all the reported data to IMO's Ship Fuel Consumption Database within a month of issuing that statement. IMO will be required to produce an annual report to MEPC, summarising the data collected in an anonymised format so individual ship data would not be recognised.

In a statement, IMO's secretariat said the data collection system "is intended to be the first in a three-step process in which analysis of the data collected would provide the basis for an objective, transparent and inclusive policy debate in the MEPC." That debate "would allow a decision to be made on whether any further measures are needed to enhance energy efficiency and address greenhouse gas (GHG) emissions from international shipping," it said.

In his opening remarks to MEPC, IMO secretary-general Kitack Lim had said that this data collection system "will demonstrate IMO's progress and strong commitment to respond to the challenges set by the Paris Agreement [on climate change]." After the draft was approved, he described the development as "a significant step" that will lead to "a solid basis on which to consider, armed with information, whether further measures may be required in future to mitigate GHG emissions from shipping."

(Retrieved: 30 August, 2016 from www.mpropulsion.com)

1. What does MARPOL's Annex VI deal with?
2. What obligations are imposed by the new regulation?
3. How long must the raw data be kept available?
4. How often will IMO be required to produce a report to MEPC concerning a particular ship?
5. As per IMO secretary-general Kitack Lim, what is the objective of the data collection system?

GOOD LUCK!!!