

### Final Exam

#### A. Put an appropriate word from the list in the gaps that follow. (25)

*bore alloy extend optimum outlawing substitutes rate  
performed layers gauged elbow alternative flexible comply*

- Proper maintenance will \_\_\_\_\_ the life of the cylinder liner.
  - Cylinder liners are fabricated from a cast iron \_\_\_\_\_.
  - The liner has to be replaced when the wear is over 0.8% of the \_\_\_\_\_ diameter.
  - To fight cold corrosion you have to find the \_\_\_\_\_ lube oil feed rate.
  - New engines must now \_\_\_\_\_ with the Tier II NO<sub>x</sub> regulations.
  - Since the \_\_\_\_\_ of asbestos \_\_\_\_\_ insulation materials had to be found and adopted as \_\_\_\_\_.
- Insulation is available in various forms, depending on the product, such as \_\_\_\_\_ blanket, and \_\_\_\_\_ pipe and \_\_\_\_\_ sections.
- You can reduce noise by using dense membranes in composite \_\_\_\_\_.
  - Wear \_\_\_\_\_ is a measurement of the speed at which wear happens. The liner is \_\_\_\_\_ at regular intervals to calculate this speed.

*identify acid dew point element scuffing select  
integral modified contain severe dioxide*

- Fuels usually \_\_\_\_\_ sulphur, which combines with the water to form sulphuric \_\_\_\_\_.
- \_\_\_\_\_ is an adhesive type of wear which occurs when there is poor lubrication; it is a \_\_\_\_\_ form of wear.
- Cylinder liners form a(n) \_\_\_\_\_ part of a marine engine.
- Temperatures below the \_\_\_\_\_ allow steam to condense.
- Some older engines are \_\_\_\_\_ for low-load operation.
- Onboard oil analysis helps to \_\_\_\_\_ how serious the problem of cold corrosion is.
- The 'Sweep Test' helps you to \_\_\_\_\_ the correct cylinder oil.
- When coal is burnt, sulphur \_\_\_\_\_ is created.
- A marine refrigeration system is a key \_\_\_\_\_ onboard any vessel.

#### B. Provide the right derivative of the word in the parentheses. (15)

- \_\_\_\_\_ (abrade) wear is sometimes caused by \_\_\_\_\_ (catalyst) fines.
- The \_\_\_\_\_ (recommend) is for a 100 BN cylinder oil.
- One way of monitoring the condition of the cylinder liner is checking its \_\_\_\_\_ (oval).
- The \_\_\_\_\_ (distribute) is wrongly adjusted.
- Refrigeration prevents the \_\_\_\_\_ (oxide) of the cargo.

- To combat cold corrosion, one \_\_\_\_\_ (solve) is to insulate the outside of the liner so that there is a \_\_\_\_\_ (reduce) in the cooling effect.
- The condenser cools down the \_\_\_\_\_ (refrigerate) in the system.
- \_\_\_\_\_ (fiber) insulation materials are suitable to vibration environments.
- This material can also function as a sound \_\_\_\_\_ (absorb).
- In reefer ships, the temperature of the \_\_\_\_\_ (perish) cargo is controlled by the refrigeration plant.
- The \_\_\_\_\_ (condense) is used to cool down the \_\_\_\_\_ (refrigerate) in the system.
- One type of insulation is the one called \_\_\_\_\_ (remove).

**C. Match the words to their synonyms or definitions (10)**

*crucial    sluggishness    implement    conventional    faltering*  
*alteration    excessive    affect    adjust    exceed*

- Too much .....
- Go beyond certain limits .....
- Apply, put to practice/force .....
- Influence .....
- Very important .....
- Change .....
- Control .....
- Usual, common .....
- slow motion, inactivity .....
- irregular running of the engine .....

**D. IMO SMCP: fill in the missing words in the following questions. (10)**

*maximum    washing    connect    operational    stripping*  
*available    pressure    receiving    disconnected    inerted*

- Is the Oil Pollution Prevention Plan \_\_\_\_\_?
- What is the \_\_\_\_\_ loading rate?
- Is the inert gas system \_\_\_\_\_?
- When will crude oil \_\_\_\_\_ start?
- Are your tanks \_\_\_\_\_?
- What is the pumping \_\_\_\_\_?
- Can we \_\_\_\_\_ the loading arm?
- What is the backpressure for \_\_\_\_\_?
- Are the cargo hoses \_\_\_\_\_?
- Are you \_\_\_\_\_?

**E. Fill in the missing preposition in the phrases below that are used when reporting spillage. You can choose from the following: (10)**

*into with about on in up by at*

- Leak \_\_\_\_\_ manifold connection.
- Spill is \_\_\_\_\_ 2 tons.
- Treat spill \_\_\_\_\_ dispersants.
- Stand \_\_\_\_\_ oil clearance team and report.
- Spillage stopped and cleaned \_\_\_\_\_.
- Spill waste contained \_\_\_\_\_ save-all.
- Oil escaping \_\_\_\_\_ harbour water,
- Dispose the sludge \_\_\_\_\_ the sludge tank.
- Maintain contact \_\_\_\_\_ the oil terminal \_\_\_\_\_ VHF channel 14.

**F. Choose the correct answer. (15)**

- 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 diesel engine is supercharged in order to \_\_\_\_  
a. lower the no-load rpm's                      b. provide more air for combining with the fuel  
c. increase the no-load rpm's                      d. provide more fuel for combining with the air
- 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
- A scored diesel engine cylinder liner will cause \_\_\_\_  
a. high firing pressure                      b. abnormally high cooling water temperature  
c. rapid wear of piston rings                      d. combustion gases in the cooling water
- Burning fuel with a high sulphur content in a diesel engine will \_\_\_\_  
a. increase thermal efficiency                      b. cause clogging of the fuel system  
c. increase the ability of the engine to start in cold weather  
d. produce corrosion in the cylinder and exhaust systems at low loads
- Combustion knock can occur in the cylinders of a diesel engine under any condition permitting \_\_\_\_  
a. a shortened ignition delay period                      b. a lean fuel/air mixture  
c. excess fuel in the combustion chamber                      d. rapid vaporisation of injected fuel droplets
- 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. corrosive deterioration of a bearing                      b. inadequate air filtration

c. excessive ring and liner wear                      d. excessive cooling of lubricating oil

-- "Loop", "uniflow", "cross flow" are terms used to describe various types of \_\_\_

a. control air circuits    b. scavenging    c. turbochargers    d. supercharging

-- The possibility of damage from operating a diesel engine at critical speeds is reduced by the use of \_\_\_

a. an isochronous governor    b. elastic engine mounts    c. a vibration damper  
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 temperature with constant pressure  
b. rapid increase in pressure with constant temperature  
c. rapid increase in pressure and temperature  
d. rapid increase in volume and decrease in pressure

-- Which of the following operations will have a direct impact on the rate of wear in a cylinder liner?

a. quality of fuel injected                      b. amount of scavenge air in the cylinder  
c. temperature of the scavenging air                      d. compression ratio of the piston

-- Whether using a centrifuge or a simple filter, oil cleaning and filtration will be the most effective when the oil is at a \_\_\_

a. high temperature and a high viscosity    b. high temperature and a low viscosity  
c. low temperature and a high viscosity    d. low temperature and a low viscosity

-- In a diesel engine, the function of lubricating oil is to \_\_\_

a. provide a film between the shafts and bearings    b. cool the pistons and bearings  
c. remove metal or dirt particles resulting from wear    d. all of the above

## **G. Read the following article and answer the questions that follow. (15)**

### **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 when entering and leaving emission control areas (ECAs) without introducing maintenance problems.

Typically, inadequate management of the fuel switch-over process can increase the risk of thermal shock to engine components, 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 of grounding or collision.
- Outline the best time to switch over. The optimal switch-over period is different for each vessel and operators must allow sufficient time for the fuel system to be flushed 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 ensure that the optimum viscosity at the injectors is

reached. HFO is injected at  $\sim 130^{\circ}\text{C}$  and MGO needs to be cooled to  $\sim 30^{\circ}\text{C}$  in order to reach the correct viscosity. Major engine manufacturers typically recommend a maximum temperature change of  $2^{\circ}\text{C}$  per minute to help avoid thermal shock.

- Understand compatibility. There is a risk of fuel incompatibility during the switching process where fuels may mix. This may clog filters, causing engine starvation and possible shut-down. In order to understand if fuels are compatible, an industry-standard spot test can be carried out on board or a more thorough compatibility test can be requested from a reputable testing laboratory.
- Choose the correct lubricant. Cylinder oils need to be sufficiently alkaline 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 a lower base number (BN) lubricant be used.

(Retrieved: 23 June, 2016 from [www.mpropulsion.com](http://www.mpropulsion.com))

1. What problems can arise if the fuel switch-over process is not carried out adequately?
2. Why should the crew be familiar with the fuel switch-over process in relation to time and area?
3. Why should the crew know the correct temperature and viscosity of the different fuels?
4. What problems can be caused due to fuel incompatibility?
5. How can one check if fuels are compatible?