

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

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**FINAL EXAM**

**1. Fill in the gaps with a word from the list. There are two (2) extra words. (15 p.)**

*outlawing    charge    lubricating    save-alls    firing    substitutes    ingress    fuel*  
*solenoid    clover    cools    stripping    starting    suction    sluggishness    puncture    boils*

- Spill waste has been contained in \_\_\_\_\_.
- Water in the fuel or in the \_\_\_\_\_ air can considerably increase the wear rate of the liner.
- If \_\_\_\_\_ in the manoeuvring gear is observed, you should ensure that the \_\_\_\_\_ pumps, rod connections and bearings are movable.
- What is the backpressure for \_\_\_\_\_?
- Since the \_\_\_\_\_ of asbestos, alternative insulation materials had to be found and adopted as \_\_\_\_\_.
- The evaporator \_\_\_\_\_ the refrigerant back to a gas, at a very low temperature.
- If the engine turns on \_\_\_\_\_ air but stops after receiving the order to run on fuel, the \_\_\_\_\_ valves may not be deaerated.
- \_\_\_\_\_ leafing takes place between each pair of \_\_\_\_\_ quills due to the sulphur contained in the fuel oil.
- Cylinder liner wear can be minimised by avoiding any \_\_\_\_\_ of water inside the liner by properly treating the fuel oil.
- If one or more cylinders are not \_\_\_\_\_, you should check the \_\_\_\_\_ valve and the puncture valve in the fuel pump.

**2. Complete the following sentences with an appropriate word. The first letter is given. (18 p.)**

- The evaporator unit acts as a **h** \_\_\_\_\_ exchanger to cool down the air in the cargo hold or room.
- If the engine turns on fuel, but runs unevenly and does not pick up rpm, the auxiliary **b** \_\_\_\_\_ may not function properly.
- The **i** \_\_\_\_\_ quality of diesel oil is indicated by the cetane number.
- COW stands for Crude Oil **W** \_\_\_\_\_.
- If the starting air valves in the cylinder covers are defective, you should **p** \_\_\_\_\_ - test them for leakages.
- The **c** \_\_\_\_\_ promotes circulation of the refrigerant by pumping it around the system.
- When the engine runs unevenly and does not pick up rpm, the fuel **f** \_\_\_\_\_ may be blocked.
- Are your **t** \_\_\_\_\_ inerted?

- For highly corroded engines a 100 B\_\_\_\_\_ Number cylinder oil is recommended.
- Although permanent insulation is ideal for long pipe runs, it is difficult to be removed for m\_\_\_\_\_ or inspection by the crew.
- Flexible b\_\_\_\_\_ are used as a form of insulation.
- Sulphuric a\_\_\_\_\_ can reduce the cylinder liner's life span by as much as 90%.

**3. Match the words from the list to their synonyms/definitions below. There is one (1) extra word. (15 p.)**

treatment	slow-steaming	fabricated	monitor
defective	volatility	neutralise	downtime
modify	fouled	cladding	implement
adequate	dilute	condense	deformation

- change from gas to liquid (usually by cooling) .....
- dirty .....
- sufficient .....
- manufactured .....
- alter .....
- the property of changing readily from liquid to vapour/gas .....
- a covering of hard material used as protection .....
- change of shape .....
- apply .....
- lower fuel consumption during low-load operation .....
- faulty .....
- make a liquid thinner by adding water or other solvent .....
- processing .....
- time during which a machine is out of order .....
- observe and check .....

**4. Complete the sentences with the appropriate form of the words in parentheses. (15 p.)**

- If there is a fault in the \_\_\_\_\_ (**govern**), you should check that it functions with the correct oil pressure.
- Fiberglass, mineral wool, calcium silicate and ceramic insulation are considered non \_\_\_\_\_ (**combustion**).
- Micro-seizure marks run \_\_\_\_\_ (**axis**) on the liner surface and may result from \_\_\_\_\_ (**sufficient**) lubrication or excessive loading.
- Is the Inert Gas system \_\_\_\_\_ (**operate**)?
- The \_\_\_\_\_ (**dry**) consists of silica gel to remove any moisture from the refrigerant.
- Insulation is critical for personnel protection, \_\_\_\_\_ (**reduce**) of ambient heat and fire \_\_\_\_\_ (**prevent**).
- The valve to starting air \_\_\_\_\_ (**distribute**) is closed.
- You should treat spills with \_\_\_\_\_ (**disperse**).
- The \_\_\_\_\_ (**expand**) valve is controlled by a thermostat to regulate the flow of the refrigerant from the H.P. side of the system to the L.P. side.
- \_\_\_\_\_ (**adhere**) can result from poor or inadequate cylinder oil distribution around the liner surface.
- Combustion \_\_\_\_\_ (**efficient**), among other factors, can considerably affect \_\_\_\_\_ (**friction**) wear.
- \_\_\_\_\_ (**remove**) insulation is ideal for any equipment that has to be repaired in remote areas.

**5. Fill in the gaps with a word from the list. There are two (2) extra words. (15 p.)**

*corrosive    lubricant    covered    film    ash    carbon    gauged    cold    sweep  
sulphur    abrasive    scuffing    lower    micro-seizure    resistant    replaced    wear*

- \_\_\_\_\_ occurs when there is a breakdown of cylinder oil \_\_\_\_\_ thickness.
- Irregularities in the liner and piston rings coming into contact during operation are the cause of \_\_\_\_\_.
- \_\_\_\_\_ wear is caused from splinters of piston rings, as well as \_\_\_\_\_ and cat fines which are contained in heavy fuel oils.
- Cylinder liners \_\_\_\_\_ in service and they should be \_\_\_\_\_ at regular intervals to find out the extent of damage.
- \_\_\_\_\_ testing is extremely important for an operator to fully understand cylinder \_\_\_\_\_ demands.
- All insulation materials have to be \_\_\_\_\_ with a protective outer skin since they do not have a wear \_\_\_\_\_ finish.
- \_\_\_\_\_ corrosion is found more in the \_\_\_\_\_ part of the liner, as the temperature of jacket water is too low.
- \_\_\_\_\_ wear is mainly caused by the presence of \_\_\_\_\_ in heavy fuel oil.

**6. State whether the following sentences are True (T) or False (F). (12 p.)**

- Excessive cylinder liner wear can cause increased blow-by.
- Temperatures above the dew point allow steam to condense.
- Cylinder liner wear is normally the greatest in the middle of the cylinder.
- An electric drill is the best tool to use for removing the wear ridge at the top of the cylinder liner.
- The bore of a cylinder describes the inside diameter of the cylinder.
- Abrasive particles (in the fuel or in the air) cause corrosion.
- A diesel engine which is rated for normal operation at a crankshaft speed of 800 rpm, is commonly classed as a slow-speed engine.
- A centrifugal separator can satisfactorily remove sulphur compounds from fuel oil.
- In a diesel engine, one of the functions of lubrication is to cool the pistons and bearings.
- Lube oil can become contaminated by the water produced during combustion.
- Combustion knock will most likely occur as a result of using a fuel with high volatility.
- Routine monitoring of a diesel engine should include listening for abnormal noises.

**7. Choose the correct answer. (10 p.)**

- Different ... valves in a refrigeration system provide automatic opening and closing of the liquid lines.  
a. expansion                      b. relief                      c. solenoid                      d. safety
- Diesel engine lube oil diluted with diesel fuel oil is indicated by:  
a. increased viscosity                      b. decreased pour point  
c. increased flash point                      d. decreased viscosity
- Heavy residual fuel oils are heated prior to centrifuging to:  
a. reduce fuel viscosity                      b. separate fuel from lube oil  
c. reduce fuel weight                      d. increase specific gravity
- “Loop”, “uniflow”, “cross flow” are terms used to describe various types of:  
a. scavenging    b. turbochargers    c. control air circuits    d. supercharging
- A disadvantage of 4-stroke cycle over a 2-stroke cycle is:  
a. intake valves temperatures higher than exhaust valves temperatures  
b. greater weight per horsepower ratio  
c. the required use of scavenge ports  
d. higher working temperature of pistons and cylinders
- Which of the following will have a direct impact on the wear rate of 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
- A decrease in the flash point of the diesel engine lube oil indicates that the lube oil is:  
a. contaminated with carbon                      b. diluted with water  
c. diluted with fuel oil                      d. contaminated with sludge
- When the engine does not reverse when the order is given, the ... of the solenoid valve for the desired direction of rotation may not reach the engine.  
a. cable                      b. wire                      c. spring                      d. coil
- A piston is said to be at top dead centre when it is:  
a. closing the fuel ports                      b. nearest to the cylinder head  
c. farthest from the cylinder head                      d. opening the exhaust ports
- Which of the listed substances can be satisfactorily removed from diesel oil by centrifuging?  
a. gasoline                      b. fuel oil                      c. lube oil                      d. sludge
- The ... serves to collect the cooled refrigerant, and is also used to drain out the refrigerant from the system for maintenance purposes.  
a. receiver                      b. drain tank                      c. sump tank                      d. refrigerant tank
- Combustion knock can occur in the cylinders of a diesel engine under any conditions permitting:  
a. a shortened ignition delay period                      b. rapid vaporisation of injected fuel droplets  
c. a lean fuel/air mixture                      d. excess fuel in the combustion chamber
- A disadvantage of a 2-stroke cycle diesel engine is:  
a. higher working temperatures of the piston and cylinder    b. the use of scavenge air  
c. more power strokes per revolution                      d. more complicated valve gear
- The ... is used to liquify the refrigerant and to subcool it below the saturation temperature by circulating sea water, fresh water or air.  
a. condenser                      b. evaporator                      c. compressor                      d. cooler
- The possibility of damage from operating a diesel engine at critical speeds is reduced by the use of:  
a. elastic engine mounts                      b. a vibration damper  
c. an isochronous governor                      d. a cast iron bedplate with good flexible qualities

- What occurs in the combustion chamber 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 temperature with constant pressure.
  - c. Rapid increase in pressure with constant temperature.
  - d. Rapid increase in volume and decrease in pressure.
- In a diesel engine, pistons are attached to the crankshaft by:
  - a. push rods      b. connecting rods      c. lash adjusters      d. piston guides
- A scored cylinder liner will cause:
  - a. rapid wearing of piston rings      b. combustion gases in the cooling water
  - c. high firing pressure      d. abnormally high cooling water temperature
- A diesel engine is supercharged in order to:
  - a. lower the no-load rpm      b. increase the no-load rpm
  - c. provide more fuel for combining with air      d. provide more air for combining with fuel
- ... results in localised welding between points on the rings and the liner surface.
  - a. Abrasion      b. Corrosion      c. Scuffing      d. Micro-seizure

