

**FUELS**

Choose the correct answer

1. An adequate number of Yokohama …………………… are placed on the supply tanker depending on weather conditions.
2. Manifolds B. fenders C. hoses
3. After the manifold is opened, the supplier hands over the ……………stop button to the vessel. A. Emergency B. Drip C. sampling
4. Samples are ……………………for later verification of supplied product quality in case a dispute arises. A. distilled B. sealed C. pumped
5. The pumping ……………….. is up to 600 m/ h. A. rate B. emission C. excess
6. There is ……………… between the crews about pumping speed.

 A. determination B. dispute C. communication

1. The supply tankers are double- ………………….state of art tankers. A. hold B. hull C. decker
2. …………………….. distillation is the process through which the products of crude oil are obtained at different points of the distilling tower, according to their boiling temperatures. A. Treatment B. Residue C. Fractional
3. The oil obtained from an oilfield is ……………. A. distilled B. HFO C. crude
4. The process of improving quality is ……………

A. distillation B. treatment C. centrifuge

1. What remains or is left over is ……………….. A. sludge B. corrosion C. residue
2. Mud, dirt is …………………A. sludge B. residue C. crude
3. What is included or contained is ……………………. A. content B. container C. annex
4. Through what process do marine fuels come from?

A. purification B. fractional distillation C. homogenizing D. centrifuging

1. MDO produces less dirt and does not need special ............, but it is expensive.

 A. deposit B. pumping C. distillation D. treatment

1. HFO needs heating to decrease viscosity and purifying to .................... water and dirt particles. A. eliminate B. erase C. suspend D. emit
2. Sulphur is extremely harmful to metal surfaces when it turns into sulphuric acid.

 A. true B. false

1. ..............is oxidation leading to rust. A. corrosion B. scoring C. emission D. grinding
2. Discharge of gases or smoke is .............. A. residue B. corrosion C. emission
3. Deposit is …………A. froth B. scoring C. sediment D. corrosion
4. The lowest temperature at which the oil will flow.

A. flash point B. pour point C. viscosity D. heating value

1. Chemical element which can be very injurious to engine parts during combustion because it/they change into acid. A. sulphur B. carbon C. ash D. cetane
2. The temperature at which the fuel vapors produce a flash when a flame is applied.

A. flash point B. pour point C. viscosity D. heating value

1. Unburned carbon during combustion which can deposit on engine parts.

A. sulphur B. carbon sediment C. carbon residue D. carbon dioxide

1. The measure of the resistance of the fuel to movement.

A. viscosity B. lubricity C. oxidation D. density

1. Non-combustible solid material in the fuel which scratches the rubbing surfaces it comes in contact with. A. carbon dioxide B. sulphur C. acid D. ash content
2. The amount of heat given off on complete combustion of one pound of fuel.

A. cetane number B. heating value C. flash point

1. A measure of density or weight of the fuel. It also serves as a rough check on viscosity, carbon content and other qualities.

a. specific gravity B. density C. CCAI d. specific gravity

1. An indication of the quality of the ignition of the fuel.

A. heating value B. flash point C. cetane number

1. Content in water and solid particles. The higher it is, the more possible it is to cause erratic combustion and corrosion. A. water and sediment B. oxidation stability C. CCAI
2. It is expressed in kilograms per cubic metre and mainly affects the fuel separation.

A. specific gravity B. density C. acid number

1. It detects all acids present. If it is elevated it may be an indicator of other harmful components. A. sediment B. cat fines C. acid number
2. The higher the …………………….. is, the quicker the ignition. A. flash point B. Calculated Cetane Index C. Acid number
3. It refers to the tendency of fuels to react with oxygen at temperatures near ambient. It describes the relative susceptibility of the fuel to degradation by oxidation.

 A. CCAI B. Carbon residue C. Oxidation stability

1. ……………………can provide a measure of fuel ignition quality without the need to run the costly cetane number test. Ignition delay is measured using the more recent constant volume combustion chamber method.

A. cetane index B. ignition property C. lubricity

1. The……………….. is defined as the temperature at which a cloud or a haze of wax crystals starts to appear in the fuel under the test conditions. These crystals can collect in filters and eventually lead to blockage of the fuel system.

A. cloud point B. flash point C. heating point D. pour point

**Find the correct form of the word in capital letters.**

1. Fuels that are refined petroleum products are called ………………………DISTIL
2. HFO is a highly ………………………..VISCOSITY liquid.
3. Water causes ……………………………….CORRODE. It is …………………….CORRODE.
4. When something is unacceptable, it is ………………………ADMIT.
5. The person who buys something is the …………………. PURCHASE.
6. Something that is brought into force or is valid is also …………………EFFECT.
7. When something is laid down by law, it is …………………………STATUS.
8. Something that is able to be applied or done is …………………..APPLY.
9. Discharge of gases or smoke is ……………………EMIT.

**Answer the questions:**

1. What do marine fuels come from? C\_ \_ \_ \_
2. Through what process are they obtained? Fr \_ \_ \_ \_ \_ nal Dis\_ \_ \_ \_ \_ \_ ion
3. Which fuels are mainly used in marine diesel engines?
4. How do we call the fuels that are refined petroleum products?
5. How do we call the fuels that come from the residues of petroleum distillation? R\_ \_ \_ \_ ual fuels.
6. The quality of a fuel is expressed by this word. Gr\_ \_ \_
7. Which fuel is high grade oil of lower and has a high viscosity?
8. Which fuel is a high grade oil of lower viscosity than HFO?
9. How do we call any fuel whose grade lies between HFO and DO? Inter\_ \_ \_ \_ \_ \_ e fuel oil or IFO.
10. What are the differences between HFO and MDO?
11. CCAI in residual fuels stands for Calculated Carbon Aromaticity Index. What does it affect? How?

**Find the correct order of the sentences that describe the bunkering procedure.**

……………Connecting bunker hose to manifold.

……………Using the ship’s crane to hoist the bunker hose.

…….3…….Vessel’s deck crew opening the manifold.

………….Attaching bottle for drip sampling in the supply tanker.

…………. Securing supply tanker alongside the vessel.

………….. Pumping starts.

………….Vessel drip sampling for quality control.

**Fill in the gaps with the words:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *Gr gravity*  | *fenders* | *sulphur* | *particles* | *capacity* |
|  *consumption* |  *treatment* | rate | decrease | eliminate |

* An adequate number of Yokohama …………………………….are placed on the supply tanker depending on weather conditions.
* Fuel is an important criterion for the choice of the engine, since more than 50% of the total running cost of the ship is due to fuel ……………………………. Marine diesel oil is best because it produces less dirt and does not need special ……………………., but it is expensive. It may be used when the vessel is manoeuvring. Heavy fuel oil is much cheaper but it produces sludge and dirtier exhaust gases. It contains more …………………….. than diesel and, having a higher viscosity, it cannot be pressed through injectors without treatment. It needs heating to ………………..viscosity and purifying to………………………… water and dirt particles, too big to pass through the injector. Heating is done in fuel heaters mostly by electric heating, and cleaning is done in separators, centrifuges, where water and heavy …………………. are separated from the oil.
* Usually two daily service e tanks are installed, so that one tank can be filled while the other is being used. Each tank has the ……………. to provide the engine with fuel for 24 hours.
* In most fuel systems the settling tanks and daily service tanks are also called ………………. tanks.
* The pumping ………………………..is up to 600 m3/h.+

**Match the sentences:**

1. Where are the fuels stored? ---- Intermediate fuel oil.

2. How is the fuel cleaned? ----It adjusts the temperature of the fuel.

3. What is the source of marine fuels? ---- Distillate fuels

4. How do we call the fuels that are ---- In the storage tanks.

refined petroleum products?

5. How do we call any fuel whose grade ---- It raises the pressure of fuel.

lies between HFO and MDO?

6. What is the function of the settling tank? ---- Crude oil.

7. What does the viscosity regulator do? ---- By a centrifugal separator.

8. What does the booster pump do? ---- It allows water and thick particles to

 sink down.

Pages 462-

**Match the following terms to their synonyms. 10 points**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| precise | adjust | building up, gathering | improve | delay |
| corrosion | scored | sediment | strainer | insulate |

-- with deep scratches: …………………………………………………

-- enhance:………………………………………………………………….

-- mechanical wear due to rust:……………………………………..

-- accurate:……………………………………………………………………

-- a fine filter: ……………………………………………………………….

-- accumulation:…………………………………………………………………

-- lag:……………………………………………………………………………..

-- regulate:………………………………………………………………………

-- deposit:………………………………………………………………………

-- wrap up or protect against heat or cold ………………………………

**Complete the following text with the words given. -15 points**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **injectors** | **piloting** | **hydraulically** | **fitted** | **function** |
| **injection** | **lack** | **efficient** | **disperse** | **combustion** |
| **insufficient** | **stalling** | **faulty** | **timely** | **distinguished** |

The last stage of the fuel oil system is the …………….. of the fuel in the combustion chamber. This is done by the fuel injectors, which are ………………….. on the cylinder head. Their main …………….. is to inject and ……………………. in a form of spray a certain amount of fuel in the …………………..chamber.

The normal burning of the fuel and the ……………….. running of the engine depend on the precise and ………………. operation of the fuel ………………. Incorrect injection timing can cause the engine not to start or to be hard to start. It can also cause ………………… of power or cause the engine to produce white smoke, as there is …………………… temperature to properly burn the fuel. A ……………….. injection pump can be the reason behind a …………………… engine or a rough running engine. Fuel injectors are ………………… into single atomizer and multi-atomizer injectors.

Most injectors are operated …………………...

In 4-stroke diesel engines, besides the main fuel injector, there may be a …………………. injector as well, fitted at the side of the cylinder cover.

**Underline the correct alternative.- 20 points**

#### Complete the text using the following words: mineral, friction, metals, wear, heat, consult, distillation, performance, running, antifouling, sealing, coolant, corrosion, sticking, inadequate. 15 points

####  The main task of lubrication is to reduce \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ between the moving parts of an engine. In this way we ensure better \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of the engine and reduction of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ due to friction. Lubrication also acts as a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, because it absorbs a considerable amount of \_\_\_\_\_\_\_\_\_\_\_\_\_\_ which is released from friction. Furthermore, it assists the piston rings in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the combustion chamber. Moreover, it protects the surfaces from \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, even when the engine is out of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, thanks to the good tenacity lubricants have on \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Finally, it keeps the metal surfaces clean due to the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ property of lubricating oil. Correct lubrication of the engine is of great importance because \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ lubrication would lead to the seizing of bearings and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of the engine. The correct choice of lubricating oil is essential too, and we should always \_\_\_\_\_\_\_\_\_\_\_\_\_\_ the engine constructor’s manual as to the recommended type of oil for the particular engine. The types of lubricating oils used in marine diesel engines are generally \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ oils, coming from the residues of crude oil after its \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Match the words to their definitions/explanations below – 7 points**

***antifouling/ dismantle / scales/ corrosion/ friction/ purify/ sludge***

oxidation leading to rust:……………………….. remove impurities, clean: ………….

fighting dirt:…………………………………….. deposits of salts:………….rubbing between two metal surfaces:…………… disassemble:……………… mud, dirt:……………………………

**Match the following list of lub-oil additives to their functions.- 8 points**

***antioxidants, corrosion inhibitors, viscosity index improvers, wear preventers, pour point depressants, detergents, dispersants, antifoamants***

Keep sludge, carbon and other deposits suspended in the oil:

Increase the VI of the oil:

Limit the damage that is caused by friction:

Reduce foam in the crankcase:

Keep the engine parts clean of deposits:

Lower the freezing point of oil:

Prevent the oxidation of oil:

Prevent the corrosion of metal surfaces:

**Match the following words to form the correct collocations (phrases): 12 points**

**emergency/ *drain / inlet/ needle/ pumping/ fractional/ sounding/ three- way / pressure/ gudgeon/ drip/ double***

 …….. ……...............tank ……...…………..distillation ……………..…..….rate …………...… chamber fuel ………………..pipe ……………………….stem ………….…. sampling ……………… ……..pin ………………….….. hulled

……………………pipe ………..…………button ………………………..valve

**Fill in the gaps with the following words- 10 points. There are two extra words**

**Atomizers, assembly, case, seat, contains, adjusted, holder, stem, fitted, chamber, screwed, consists**

A fuel injector ……………. of three main parts. The injector ………………, the needle with its ………………… and return spring and the nozzle ……………. Inside the cylindrical holder there is a centrally formed cylindrical …………. where the needle stem and its return spring are ………….. The nozzle assembly is …………at the bottom of the injection holder. It has one or more …………….. through which the fuel is sprayed in the combustion ……………The pressure chamber is a hollow space inside the assembly which ends to a tapered …………where the injection needle ends too.

**Read the following passage on the properties of lube oils and underline the correct alternative.** The properties of lubricating oils are similar to / different from those of fuel oils. Viscosity is the least / most important property of lube oils. The Society of Automotive Engines / Engineers SAE has classified / divided oil viscosity from SAE 10 to SAE 250. SAE 10 to SAE 20 oils are very thin / thick and are suitable for low /high temperatures. SAE 30 to SAE 50 oils having a medium to high viscosity are unsuitable / suitable for diesel engines. The viscosity index, VI, of the oil is of equal importance because it indicates how stable the oil is to variations of temperature. Chemical stability is an important specification of lube oil, too. The acid / base neutralising capacity of oil is represented by its total base number (TBN) value, which indicates the oil’s acid / alkaline reserve. The higher / lower the TBN is, the more acid neutralising capacity the oil has. 2 3.

**Fill in the gaps using the words below. (15 p.) assembly, distillation, needle, transition, holder, settling, insufficient, alkaline, atomizers, water, circulated, mixing, injection, viscosity, white --** Incorrect \_\_\_\_\_\_\_\_\_\_\_\_\_\_ timing can cause lack of power or can cause the engine to produce \_\_\_\_\_\_\_\_\_\_\_\_\_\_ smoke as there is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ temperature to properly burn the fuel. -- In some cases, a \_\_\_\_\_\_\_\_\_\_\_\_\_\_ tank is used for the gradual \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ from HFO to MDO. This tank can hold a quantity of fuel which will be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and led to the engine. -- In the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ tank the fuel is constantly heated to decrease the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and thus quicken the separation of fuel from \_\_\_\_\_\_\_\_\_\_\_\_\_\_ and impurities. -- The total base number (TBN) value of a specific oil indicates its \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ reserve. -- The process through which marine fuels are obtained is called fractional \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ -- The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ stem and its return spring of the fuel injector are fitted in the injector \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. -- The nozzle \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ has one or more \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ through which the fuel is sprayed into the combustion chamber.

**Match the following words to their synonyms/definitions. (10 p.)** **purify, buffer tank, fighting dirt, emission, stalling, seizing, faulty, corrosion, tenacity, atomizer** –

- balancing/mixing tank: -- oxidation leading to rust: -- antifouling: -- defective: -- discharge of gases: -- remove impurities, clean: -- major damage of bearings due to insufficient lubrication: -- sticking property: -- opening through which the fuel is sprayed: -- reduction of revolutions, eventual stopping of the engine:

**Fill in the gaps using the words below. There are two extra words. (15 p.) fortified, erratic, acid, drillings, mixing, injection, assembly, sufficient, needle, transition, injurious, capacity, holder, insufficient, alkaline, atomizers, grooves** –

-Each service tank has the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to provide the engine with fuel for 24 hours. –

 -Lube oils are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ with chemicals. –

- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in the crankshaft take the oil to the crankpin and bottom end bearings. 2 –

- The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ stem and its return spring of the fuel injector are fitted in the injector \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. –

- The nozzle \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ has one or more \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ through which the fuel is sprayed into the combustion chamber. –

- The total base number (TBN) value of a specific oil indicates its \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ reserve. –

- Sulphur can be very \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to engine parts during combustion, because it changes into \_\_\_\_\_\_\_\_\_\_\_\_\_. –

- High water content in fuel causes \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ combustion and corrosion. –

- Incorrect \_\_\_\_\_\_\_\_\_\_\_\_\_\_ timing can cause lack of power or can cause the engine to produce white smoke, as there is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ temperature to properly burn the fuel. –

- In some cases, a \_\_\_\_\_\_\_\_\_\_\_\_\_\_ tank is used for the gradual \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ from HFO to MDO

**Write down the additives which enhance the following properties of lub-oils. (8 p.) --** Limit the damage due to friction: w\_\_\_\_\_\_\_\_\_\_\_\_ preventers -- Lower the freezing point of oil: p\_\_\_\_\_\_\_\_\_\_\_\_\_ - point depressants -- Keep the engine parts clean: d\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ -- Reduce foam in the crankcase: anti - f\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ -- Prevent the corrosion of metal surfaces: corrosion i\_\_\_\_\_\_\_\_\_\_

**Complete the sentences with the correct form of the words in parentheses.(11 p**.) -- Most fuel \_\_\_\_\_\_\_\_\_\_\_\_\_\_ (inject) are operated \_\_\_\_\_\_\_\_\_\_\_\_\_\_ (hydraulic). -- The HFO \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (purify) separates water and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (impure) from the fuel. -- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (add) in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (lubricate) oil improve its quality. 4 -- This oil is too \_\_\_\_\_\_\_\_\_\_\_\_\_(viscosity). We should make it thinner by heating. -- This is an engine of high \_\_\_\_\_\_\_\_\_\_\_\_\_ (efficient) -- The TBN value of a lube oil eliminates the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (corrode) influence of acid. -- The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (remove) of water and foreign particles in the lube oil is done in a centrifugal \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (separate).

**Complete the text using the words given below (15 p.): circulating, four, twelve, sump, guides, crosshead, pressure, bearing, supply, cooler, autoclean, filters, piston, drains, lubricates**

 In the lubrication of ME with \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ LO, the oil is taken from the ME LO circulating tank through \_\_\_\_\_\_\_\_\_\_\_\_\_\_ by screw-type pumps. It passes through a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ filters, and ends in the main engine at a pressure of about \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ bars. It lubricates the main crankshaft \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, the crankshaft and camshaft drive. A separate \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is led to the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ by high \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ pumps at a pressure of about \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ bars. It \_\_\_\_\_\_\_\_\_\_\_\_\_ the crosshead and the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Some of the oil travels back through the piston rod and cools the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. The used oil \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ into the circulating tank or the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ tank.

**Fill in the gaps with the right word from the list. (15 p.) injectors, capacity, particles, sludge, atomisers, suspending, injurious, sulphur, fortified, eliminate, assembly, erratic, acid, drillings, coagulate**

 --Heavy fuel oil produces \_\_\_\_\_\_\_\_\_\_\_\_\_\_ and dirtier exhaust gases. It contains more \_\_\_\_\_\_\_\_\_\_\_\_\_ than diesel and, having a higher viscosity, it cannot be pressed through \_\_\_\_\_\_\_\_\_\_\_\_\_ without heating. It also needs purifying to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ water and dirt \_\_\_\_\_\_\_\_\_\_\_\_\_.

--Sulphur can be very \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to engine parts during combustion because it changes into \_\_\_\_\_\_\_\_\_\_\_\_\_.

 --High water content in fuel causes \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ combustion and corrosion. --Sediment is formed when \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ solid particles in the fuel \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and sink down.

 --Each service tank has the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to provide the engine with fuel for 24 hours. --Lube oils are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ with chemicals.

--\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in the crankshaft take the oil to the crankpin and bottom end bearings.

 -- The nozzle \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ has one or more \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ through which the fuel is sprayed into the combustion chamber

|  |
| --- |
| **Underline the correct alternative.**  **20 points** |

-The crosshead and the guides are lubricated by **cylinder oil/ circulating lube oil/ turbine oil.**

-The properties of lubricating oils are ***similar to / different from*** those of fuel oils.

-Viscosity is the ***least / most*** important property of lube oils.

-The Society of **Automotive Engines/ Automotive Engineers** has **distributed/ *classified / divided*** oil viscosity from SAE 10 to SAE 250.

SAE 10 to SAE 20 oils are very ***thin / thick*** and are suitable for **medium/ *low /high*** temperatures.

SAE 30 to SAE 50 oils having a medium to high viscosity are ***unsuitable / suitable*** for diesel engines. The viscosity **indicator/ index/ ignition** or VI of the oil is of equal importance because it indicates how stable the oil is to variations of temperature.

-The ***acid / base*** neutralising capacity of oil is represented by its TBN value, which indicates the oil’s **residual/ *acid / alkaline*** reserve. The ***higher / lower*** the TBN is, the more acid neutralising capacity the oil has.

-The higher the viscosity of a fuel oil, the **more/ less** heating it needs to reduce it.

-The element which causes oxidation to the engine is **ash/ sulphur/ silicon**.

-The acronym CCAI stands for **calculated calcium aroma indication/ cracked carbon atom index/ calculated carbon aromaticity index**.

-The heating value of a fuel is commonly expressed in **r.p.m./ b.t.u./p.p.m.**

**-**The cylinder oil is drawn from the **sump/ storage/ drain** tank to a **small/ medium/ big** service tank by separate pumps. From there, the oil is supplied to lubricators by gravity and is led through the drillings onto the liner surface where grooves **distribute/ attribute/ divide** around the liner, and the piston **rings/ rod** spread it up and down the surface of the liner.

|  |
| --- |
| **Fill in the gaps of the following passage about lubrication with the following words:** *absorb/ seizing / task / tenacity/antifouling /sealing/ ensure/ wear/ released/ inadequate* **10 points** |

The main ………….. of lubrication is to reduce friction between the moving parts of an engine. In this way we ……………. better performance of the engine and reduction of …………... Lubrication also acts as a cooling means of the metals surfaces as it can……………… a considerable amount of heat which is ……………… from friction. It also protects the surfaces from corrosion thanks to the good …………….. lubricants have on metals. Furthermore, it assists the piston rings in …………………… the combustion chamber. …………………..lubrication could lead to…………….. of bearings and sticking of the engine.

Finally, it keeps the metal surfaces clean due to the ……………… property of the lubricating oil.

**Choose the correct answer: Revisional Exercises**

1. The last stage of the fuel oil system is the …………….. of the fuel in the combustion chamber.

Insulation/ injection/ exhaust

1. The injection is done by the fuel injectors which are …………..on the cylinder head. Fitted/ boosted/ spread
2. The main function of the fuel injectors is to inject and ……………….. in a form of spray a certain amount of fuel in the combustion chamber. Disperse/ settle down/ stall
3. The normal burning of the fuel and the efficient running of the engine depend on the ……………..and timely operation of the fuel injectors. Precise/ precisely/ precision
4. Incorrect injection timing can cause the engine not to start or to be hard to start. It can also cause lack of power or cause the engine to produce smoke as there is ………………….temperature to properly burn the fuel. Sufficient/ insufficient/ adequate
5. A faulty injection pump can be the …………… behind a stalling engine or a rough running engine. Culprit/ guilt
6. Fuel injectors are ……………………..into single atomizer and multi atomizer injectors. Determined/ distinguished/ consisted
7. Most injectors are operated hydraulically. In 4 stroke diesel engines, besides the main fuel injector, there may be a ……………...injector as well. Piloting/ timely/ culprit
8. A fuel injector consists of three main parts. The injector holder, the needle with its stem and return spring and the nozzle ………………….. assembly/ component/ tip
9. Inside the cylindrical holder there is a centrally formed cylindrical case where the needle stem and its return ………………...are fitted. Spring/ spread/ ring
10. The nozzle assembly is ……………….at the bottom of the injector holder. Screwed/ mounted/ tapered
11. The nozzle assembly has one or more atomizers through which the fuel is sprayed into the …………….chamber. water/ combustion/ drain
12. The pressure chamber is a hollow space inside the assembly which ends to a ……………….seat where the injector needle ends too. Tapered/ rectangular/ hollow
13. Most fuel injectors are operated …………………. Mechanically/ hydraulically/ manually
14. The lowest part of the fuel injection valve is the ............ needle/ injector holder/ nozzle assembly
15. HFO is ....................... than diesel oil. Less viscous/ more viscous/ as viscous as
16. Thick particles sink down in the ................... buffer tank/ settling tank/ service tank
17. Excess is …disperse/ boost/ surplus
18. Secondary is ….precise/ subordinate/ piloting
19. Which of the following words is not a synonym to the others? Refine/ purify/ distil/ prepare
20. Which of the following words is not a synonym to the others? Deposit/ residue/ froth/ sediment/ sludge
21. Which of the following words is not a synonym to the others? Include/ comprise/ contain/ define
22. Which of the following words is not a synonym to the others? Compare/ regulate/ adjust/ control
23. To improve is to… adjust/ enhance/ boost
24. Sticking property, adhesion is…fouling/ tenacity/ seizing
25. Duty, function is… task/ friction/ tenacity
26. Major damage of bearing due to insufficient lubrication is… fouling/ enhancement/ seizing
27. Lubrication assists the piston rings in ..............the combustion chamber. Stalling/ seizing/ sealing
28. The ............neutralizing capacity of oil is represented by its TBN. Acid/ base/ alkaline
29. Bearings are lubricated with… cylinder oil/ circulating lube oil/ turbine oil
30. ....in the lubricating oil improve its quality. Addings/ additionals/ additives
31. The TBN value of a lube oil eliminates the ...............influence of acid. Corroded/ corrosion/ corrosive
32. The higher the viscosity of a fuel oil, the more heating it needs to reduce it. T/ F
33. Sediment is formed when suspending solid particles in the fuel coagulate and sink down. T/F
34. SAE 10 to SAE 20 oils are ....and are suitable for low temperatures. T/F
35. The lubrication of the cylinder is very important because it ………… the acid products of combustion. Neutralizes/ enhances/ scores
36. The crosshead is lubricated by ………….. cylinder oil/ circulating lube oil/ turbine oil
37. Lubrication of the main engine is done with…. cylinder oil/ circulating lube oil/ turbine oil
38. To ............is to control or adjust. Purchase/ draw/ regulate/ enhance
39. What does the viscosity regulator do? It allows the water and thick particles to sink down./ It adjusts the temperature of fuel./ It allows the used oil from the engine to be mixed.
40. In most fuel systems, the settling tanks and daily service tanks are also called ........... tanks. Gravity/ sludge/ fuel oil drain
41. The ...............neutralizing capacity of oil is represented by its total base number value. Acid/ base/ alkaline
42. From the service tank the oil is supplied to lubricators by gravity and is led through drillings onto the liner surface where grooves .................it circumferentially. Separate/ attribute/ distribute
43. To get rid of, to remove is to ................. effect/ eliminate/ purchase
44. Additives can help when there is major ............of deposits on the piston crown and cylinder liner. Accumulate/ accumulative/ accumulation
45. In a typical fuel oil system, the Diesel is a refined oil and does not pass through a settling tank, but instead it passes through a centrifuge for ...............and then enters the DO tank. Purify/ purification/ purifier/ purify
46. In the fuel oil system, from the viscosity regulator the fuel passes through a ................which filters the fuel. Regulator/ strainer/ separator
47. From the service tank the oil is supplied to lubricators by gravity and is led through drillings onto the liner surface where grooves .................it circumferentially. Separate/ attribute/ distribute
48. The correct choice of lubricating oil is essential and we should always ..............the engine constructor's manual as to the recommended type of oil for the particular engine. Disperse/ enhance/ consult/ inhibit
49. The 3-way/ non-return/ safety valve allows us to change from HFO to MDO.

#### The temperature indicator/ density controller/ viscosity regulator adjusts the fuel oil temperature in order to provide the correct viscosity for combustion.

#### A pressure regulating/ 3-way/ relief valve ensures a constant-pressure supply to the engine-driven fuel pumps.

#### The sump/ storage/ mixing tank is used to collect the recirculated fuel oil.

#### The purifier/strainer/ settling tank separates water and impurities from the fuel by means of centrifugal force.

#### The transfer/ booster/ feed pump increases the pressure of the fuel just before it is delivered to the engine.

#### Marine fuel oils come from refined/ distilled/ crude oil.

#### The word class/ grade/ index shows the quality of fuel which indicates how well a fuel will burn in the cylinders.

#### The pistons are lubricated by cylinder oil/ circulating lube oil/ turbine oil.

#### The bearings are lubricated by cylinder oil/ circulating lube oil/ turbine oil.

#### Any fuel whose grade lies between HFO and MDO is medium/ intermediate/ residual fuel oil.

#### IFO/ HFO/ MDO is mainly used in manoeuvring and in ECAs.

#### The buffer tank is also called mixing/ double bottom/ storage tank.

#### The daily tank is also called storage/ service/ settling tank.

#### The heating value of a fuel is commonly expressed in r.p.m./ b.t.u./p.p.m.

#### The acronym CCAI stands for Calculated Carbon Aroma Indication/ Cracked Carbon Atom Index/ Calculated Carbon Aromaticity Index.

#### Lube oils with a viscosity around SAE 15 are suitable/ unsuitable/proper for diesel engines.

#### The acid/ base neutralising capacity of oil is represented by its TBN value, which indicates the oil’s residual/ acid / alkaline reserve.

|  |
| --- |
| **Match the following words to form the correct collocations (phrases):** emergency/ *drain/ VI / nozzle/ injector/ inlet/ needle/ pumping/ fractional/ sounding/ three- way / pressure/ gudgeon/ drip/ double* **15 points** |

……………...assembly ……. ……...............tank ……...…………..distillation

 ...................... improver ……………..…..….rate ………….………….holder

 …………...… chamber fuel ………………..pipe ……………………….stem

 ………….…. sampling ……………… ……..pin ………………….….. hulled

……………………pipe ………..…………button ………………………..valve

|  |
| --- |
| **Fill in the gaps with the appropriate derivative words. 10 points** |

1. ………………………..ADD in the lubricating oil improve its quality.
2. The TBN value of the lube oil eliminates its ……………………..CORROSION influence of the acid.
3. Wear ………………….PREVENT limit the wear due to friction.
4. The.....…………………CENTRIFUGE separatorseparates water and ……………………IMPUREfrom the fuel.
5. Empty the …………………….CONTAIN of this box on the floor.
6. …………………..SULPHUR acid can cause damage.
7. This is an engine of high ………………….…..EFFICIENT.
8. This oil is too …………………..VISCOSITY. We should make it thinner by heating.
9. Chemical ……………………STABLEis an important specification of lubricating oils.
10. The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (remove) of air from the cylinders is done with the help of air cocks.
11. The HFO \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (purify) separates water and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (impure) from the fuel. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (sulphur) acid is very \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (corrosion).
12. This is an engine of high \_\_\_\_\_\_\_\_\_\_\_\_\_ (efficient).
13. This oil is too \_\_\_\_\_\_\_\_\_\_\_\_\_(viscosity). We should make it thinner by heating.

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| --- |
| **Fill in the gaps with the correct words. The first letter is given. 15 points** |

-The correct choice of lubricating oil is essential and we should always consult the engine constructor’s **m**………………….

-The oil is discharged through a fine **f**………………..to the main engine fuel pump suctions.

-The clean oil is pumped into the heavy oil **s**……………….tanks which are in duplicate, as one is in use, while the other is being filled. From there the oil, after passing through the **b**…………….tank, is pumped by a **b**……………..pump, or high pressure pump, into a **h**…………….. and right after into a viscosity **r**……………

-The types of lubricating oils used in marine diesel engines are generally mineral oils, coming from **r**……………………..(base stock) of **c**……………….. oil after its distillation.

-HFO is much cheaper than diesel, but it produces **s**……………and dirtier exhaust gases.

**Match the following words to form the correct collocations (phrases): 12 points**

**emergency/ *drain / inlet/ needle/ pumping/ fractional/ sounding/ three- way / pressure/ gudgeon/ drip/ double***

 …….. ……...............tank ……...…………..distillation ……………..…..….rate …………...… chamber fuel ………………..pipe ……………………….stem ………….…. sampling ……………… ……..pin ………………….….. hulled……………………pipe ………..…………button ………………………..valve

|  |
| --- |
| **Fill in the gaps with the following words to make synonyms. THERE ARE TWO EXTRA WORDS***: fortify/ adjust/ insulate/ grade/ inadmissible/ atomiser/ purchaser/ emission/ friction / effective/ surplus/ sink* **05 points**  |

strengthen ………………….. wrap up or protect against heat………………

the person who buys something……………. settle down…………….

 excess……………….. rubbing between two metal surfaces…………..

discharge of gases………………………… brought into force…………… regulate……………….. opening through which fuel is sprayed …………

**Fill in the correct form of the word in capital letters:**

1. The [accumulation] ACCUMULATE of sludge is unavoidable.
2. The engine needs [lubricating] LUBRICATE regularly.
3. Ash content can cause [abrasive] ABRASIVE wear.
4. Rags are used in ships because the are very [absorbent] ABSORB.
5. The bearing was [defective] DEFECT and had to be replaced.
6. [combustible] COMBUSTION materials should not be stored near furnaces or open fires.
7. [residual] RESIDUE fuels come from residues.
8. The engineer needed to do some more [adjust] ADJUST in order to fix the injector.
9. The [consumption] CONSUME of fuel in ships is very costly.
10. They needed to check the [alignment] of the crankshaft.

ANSWERS FOR THE MULTIPLE CHOICE QUESTIONS

FUELS

Choose the correct answer

1. An adequate number of Yokohama …………………… are placed on the supply tanker depending on weather conditions.

A. Manifolds B. fenders C. hoses

2. After the manifold is opened, the supplier hands over the ……………stop button to the vessel. A. Emergency B. Drip C. sampling

3. Samples are ……………………for later verification of supplied product quality in case a dispute arises. A. distilled B. sealed C. pumped

4. The pumping ……………….. is up to 600 m/ h. A. rate B. emission C. excess

5. There is ……………… between the crews about pumping speed.

 A. determination B. dispute C. communication

6. The supply tankers are double- ………………….state of art tankers. A. hold B. hull C. decker

7. …………………….. distillation is the process through which the products of crude oil are obtained at different points of the distilling tower, according to their boiling temperatures. A. Treatment B. Residue C. Fractional

8. The oil obtained from an oilfield is ……………. A. distilled B. HFO C. crude

9. The process of improving quality is ……………

A. distillation B. treatment C. centrifuge

10. What remains or is left over is ……………….. A. sludge B. corrosion C. residue

11. Mud, dirt is …………………A. sludge B. residue C. crude

12. What is included or contained is ……………………. A. content B. container C. annex

13. Through what process do marine fuels come from?

A. purification B. fractional distillation C. homogenizing D. centrifuging

14. MDO produces less dirt and does not need special ............, but it is expensive.

 A. deposit B. pumping C. distillation D. treatment

15. HFO needs heating to decrease viscosity and purifying to .................... water and dirt particles. A. eliminate B. erase C. suspend D. emit

16. Sulphur is extremely harmful to metal surfaces when it turns into sulphuric acid.

 A. true B. false

17. ..............is oxidation leading to rust. A. corrosion B. scoring C. emission D. grinding

18. Discharge of gases or smoke is .............. A. residue B. corrosion C. emission

19. Deposit is …………A. froth B. scoring C. sediment D. corrosion

20. The lowest temperature at which the oil will flow.

A. flash point B. pour point C. viscosity D. heating value

21. Chemical element which can be very injurious to engine parts during combustion because it/they change into acid. A. sulphur B. carbon C. ash D. cetane

22. The temperature at which the fuel vapors produce a flash when a flame is applied.

A. flash point B. pour point C. viscosity D. heating value

23. Unburned carbon during combustion which can deposit on engine parts.

A. sulphur B. carbon sediment C. carbon residue D. carbon dioxide

24. The measure of the resistance of the fuel to movement.

A. viscosity B. lubricity C. oxidation D. density

25. Non-combustible solid material in the fuel which scratches the rubbing surfaces it comes in contact with. A. carbon dioxide B. sulphur C. acid D. ash content

26. The amount of heat given off on complete combustion of one pound of fuel.

A. cetane number B. heating value C. flash point

27. A measure of density or weight of the fuel. It also serves as a rough check on viscosity, carbon content and other qualities.

a. specific gravity B. density C. CCAI d. specific gravity

28. An indication of the quality of the ignition of the fuel.

A. heating value B. flash point C. cetane number

29. Content in water and solid particles. The higher it is, the more possible it is to cause erratic combustion and corrosion. A. water and sediment B. oxidation stability C. CCAI

30. It is expressed in kilograms per cubic metre and mainly affects the fuel separation.

A. specific gravity B. density C. acid number

31. It detects all acids present. If it is elevated it may be an indicator of other harmful components. A. sediment B. cat fines C. acid number

32. The higher the …………………….. is, the quicker the ignition. A. flash point B. Calculated Cetane Index C. Acid number

33. It refers to the tendency of fuels to react with oxygen at temperatures near ambient. It describes the relative susceptibility of the fuel to degradation by oxidation.

 A. CCAI B. Carbon residue C. Oxidation stability

34. ……………………can provide a measure of fuel ignition quality without the need to run the costly cetane number test. Ignition delay is measured using the more recent constant volume combustion chamber method.

A. cetane index B. ignition property C. lubricity

35. The……………….. is defined as the temperature at which a cloud or a haze of wax crystals starts to appear in the fuel under the test conditions. These crystals can collect in filters and eventually lead to blockage of the fuel system.

A. cloud point B. flash point C. heating point D. pour point

**Choose the correct answer: Revisional Exercises**

1. The last stage of the fuel oil system is the …………….. of the fuel in the combustion chamber.

Insulation/ injection/ exhaust

2. The injection is done by the fuel injectors which are …………..on the cylinder head. Fitted/ boosted/ spread

3. The main function of the fuel injectors is to inject and ……………….. in a form of spray a certain amount of fuel in the combustion chamber. Disperse/ settle down/ stall

4. The normal burning of the fuel and the efficient running of the engine depend on the ……………..and timely operation of the fuel injectors. Precise/ precisely/ precision

5. Incorrect injection timing can cause the engine not to start or to be hard to start. It can also cause lack of power or cause the engine to produce smoke as there is ………………….temperature to properly burn the fuel. Sufficient/ insufficient/ adequate

6. A faulty injection pump can be the …………… behind a stalling engine or a rough running engine. Culprit/ guilt

7. Fuel injectors are ……………………..into single atomizer and multi atomizer injectors. Determined/ distinguished/ consisted

8. Most injectors are operated hydraulically. In 4 stroke diesel engines, besides the main fuel injector, there may be a ……………...injector as well. Piloting/ timely/ culprit

9. A fuel injector consists of three main parts. The injector holder, the needle with its stem and return spring and the nozzle ………………….. assembly/ component/ tip

10. Inside the cylindrical holder there is a centrally formed cylindrical case where the needle stem and its return ………………...are fitted. Spring/ spread/ ring

11. The nozzle assembly is ……………….at the bottom of the injector holder. Screwed/ mounted/ tapered

12. The nozzle assembly has one or more atomizers through which the fuel is sprayed into the …………….chamber. water/ combustion/ drain

13. The pressure chamber is a hollow space inside the assembly which ends to a ……………….seat where the injector needle ends too. Tapered/ rectangular/ hollow

14. Most fuel injectors are operated …………………. Mechanically/ hydraulically/ manually

15. The lowest part of the fuel injection valve is the ............ needle/ injector holder/ nozzle assembly

16. HFO is ....................... than diesel oil. Less viscous/ more viscous/ as viscous as

17. Thick particles sink down in the ................... buffer tank/ settling tank/ service tank

18. Excess is …disperse/ boost/ surplus

19. Secondary is ….precise/ subordinate/ piloting

20. Which of the following words is not a synonym to the others? Refine/ purify/ distil/ prepare

21. Which of the following words is not a synonym to the others? Deposit/ residue/ froth/ sediment/ sludge

22. Which of the following words is not a synonym to the others? Include/ comprise/ contain/ define

23. Which of the following words is not a synonym to the others? Compare/ regulate/ adjust/ control

24. To improve is to… adjust/ enhance/ boost

25. Sticking property, adhesion is…fouling/ tenacity/ seizing

26. Duty, function is… task/ friction/ tenacity

27. Major damage of bearing due to insufficient lubrication is… fouling/ enhancement/ seizing

28. Lubrication assists the piston rings in ..............the combustion chamber. Stalling/ seizing/ sealing

29. The ............neutralizing capacity of oil is represented by its TBN. Acid/ base/ alkaline

30. Bearings are lubricated with… cylinder oil/ circulating lube oil/ turbine oil

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44. To get rid of, to remove is to ................. effect/ eliminate/ purchase

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46. In a typical fuel oil system, the Diesel is a refined oil and does not pass through a settling tank, but instead it passes through a centrifuge for ...............and then enters the DO tank. Purify/ purification/ purifier/ purify

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