Экзаменационные билеты для специальности ЭСУ

Английский язык (специализация)

Билет №1.

Задание 1. Перевести текст «Operating troubles in General» на русский язык.
Задание 2. Устная тема «My Speciality».
Задание 3. Rendering the article (комментирование статьи).

Билет №2.

Задание1. Перевести текст «Starting system» на русский язык.
Задание 2. Устная тема «Marine training Practice».
Задание 3. Rendering the article (комментирование статьи).

Билет №3.

Задание 1. Перевести текст «Maneuvering Ship under Way» на русск. язык.
Задание 2. Устная тема «The Motorman Duties».
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Билет №4.

Задание 1. Перевести текст «Preparation Under Normal Conditions» на русск. язык.
Задание 2. Устная тема «The Crue».
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Билет №5.

Задание 1. Перевести текст «Trouble shouting» на русск. язык.
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Билет №6.

Задание 1. Перевести текст «Preparation Before Starting» на русск. язык.
Задание 2. Устная тема «The Sea Protest».
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Билет№7.

Задание 1. Перевести текст «Difficulties During operation» на русск. язык.

Задание 2. Устная тема «Sea Pollution».
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Билет №8.

Задание 1. Перевести текст «Preparation For Starting the Engine» на русск. язык.
Задание 2. Устная тема «Khabarovsk».
Задание 3. Rendering the article (комментарии к статье).

Билет №9.

Задание 1. Перевести текст «Procedure When Engine is Running» на русск. язык.
Задание 2. Устная тема «Pacific National University».
Задание 3. Rendering the article (комментарии к статье).

Билет №10.

Задание 1. Перевести текст «Cracked Cylinders And Cylinder Heads» на русск. язык.
Задание 2. Устная тема «Cycles of Diesel Engines ».
Задание 3. Rendering the article (комментарии к статье).

PREPARATIONS FOR STARTING THE ENGIN

All marine engines are started with compressed air and it is highly important that the supply of starting air and the means for renewing it be ample.

The starting air is stored in tanks, cylinders which may have a combined capacity of as much as 2,100 cubic feet. A good rule is to supply 35 c.f. of starting air storage for each engine for each c.f. of volume swept through by one piston in one power cylinder. The air is usually carried at 300 to 400 pounds pressure (about 30 kg/cm*).

Preparations for getting under way are started in the engine room an hour or more before leaving.

The first step is to turn each engine through a complete revolution with the turning gear to see that everything is free and clear for running, alter which the turning gear is disconnected. The lubricating oil circulating pump and other pumps are then started and an inspection made to see that the oil circulates freely and reaches all of the bearings.

If the compression in the power cylinder is right and all other conditions normal, any Diesel engine should start readily; but the quick starting is assured if a means is provided for heating up the cylinders and heads before starting.

In order to ensure prompt beginning of combustion when the engine is started and thus reduce the amount of starting air used, it is essential that fuel oil pump discharge, into the spray valve should begin as soon as the fuel pump plungers begin to move.

The final steps in preparations should include opening of the main stop valves in starting air lines. Inspection of gauges to see that air pressures are up to normal and fuel oil service tanks full.

MANOEUVRING THE SHIP AND UNDER WAY

In manoeuvring the ship, maintenance of the starting air supply is very important. With a warm engine not more than two revolutions on air are required before ignition of fuel occurs.

In case of reversal of direction of motion, the automatic venting of cylinders prevents any piston that has started a down stroke, from being resisted by compressed air above it when it starts back in the other direction. If the engine manoeuvring involves reversal when the ship has considerable momentum through the water, the engine tends to keep turning under the influence of the propeller. The Dox-ford engine uses a system of automatic pressure braking in which all the cylinders are connected by brake pipes. The control valves are so connected that when stopping, communication is opened between a cylinder finishing compression and one just starting compression, the added resistance to compression stops the engine quickly.

During long continued periods of manoeuvring attention should be paid to operating the independent cooling water pump. If a considerable period of time passed between successive starts- of the engine, the pump should not be kept running long enough to cool the cylinders too much. After the engine is worked up to normal operating speed, lubricators adjusted, cooling water adjusted until the desired running temperatures are obtained, starting air compressor is secured, the sea routine is started. Normally there are certain conditions that must be maintained in order to ensure good performance on the part of the engines. These conditions have to do principally with the fuel oil, cooling water and lubricating oil.

Preparation Before Starting.

(1) Open circulating water pump delivery valve or any alternative supply to engine.
(2) Open water outlet valve.
(3) Open pressure indicator cocks to release compression whilst barring engine.
(4) Ensure control handwheel is in STOP position.
(5)Check pressure in starting air receiver.
(6) Bar engine round at least two revolutions.
Prime lubricating oil system whilst barring until pressure is shown on gauge.
(7) Close all pressure indicator cocks.
(8) Open cock in fuel supply pipe.
(9) Reset lubricating oil failure stop gear.
(10) Set load limit dial on governor.

Procedure When Engine is Running:

(1) Close the starting valve on air receiver.
(2) Adjust speed regulator to required speed.
(3) Check lubricating oil pressure.
(4) Recharge air receiver as soon as possible to 300 p.s.i. (21.1 kg/sq.cm).
(5) Set load limit dial on governor.

Running on Load:

(1) Regulate cooling water to give an outlet temperature, between 160 deg.F and 170 deg,F (71°C and 77°C).
(2) Maintain lubricating oil pressure of 30 p.s.i. (2.11 kg/sq.cm)
(3) When necessary adjust fuel pumps to give balanced exhaust outlet temperatures and maximum pressures.

To Stop Engine:

(1) Rotate handwheel to STOP position.
(2) Close cock in fuel supply system.
(3) Where systems permit it is advisable to allow the circulating water to flow through the engine for about 15 minutes after the engine has stopped allowing the engine to cool slowly.

First Run:

If the engine is being run after an overhaul, the following procedure should be adopted:

(1) Check all external parts for evidence of overheating.

(2) Stop engine after 5/10 minutes running.
(3) Remove column inspection doors and check internal bearings and running gear to ensure that there is no abnormal heating. If there is any evidence of internal overheating while running stop the engine immediately but do not remove any doors until at least 15 minutes after the engine has stopped.
(4) Apply load gradually for the first few hours whenever possible especially if new pistons and liners have been fitted.

OPERATING TROUBLES IN GENERAL

Every engineer knows that it is impossible to predict all the possible troubles that may arise in an engine room. Most of the possibilities for derangements of a general nature include the following.

Water in fuel oil. Water may get into the fuel oil by leakage through defective welding of tanks, through alternate use of tanks for fuel oil and water ballast, or the fuel oil as delivered into the tanks may contain considerable moisture that will settle out. The troubles then are cracked heads and pistons, burned out exhaust valves, injection valve, H.P. fuel pumps.

Improperly refined oil. Fuel oil must, during the refining process, be treated with sulphuric acid and this acid must later be neutralized with soda. When the engine is opened up after running on the insufficiently washed oil, the entire surface of the combustion spaces in the cylinders has a coating of gritty material which is mostly sodium sulphate. It causes considerable wear of piston rings and cylinder liners.

Loss of power or slowing down of engine. When this occurs the first possibility that should be investigated is hot bearings. Other causes are failure of fuel to one or more cylinders, derangement of valves or valve gear or a fall in cooling water temperature.

Cracked cylinders and cylinder heads. Cracks may result from unequal heating due to poor design, bad castings, air pockets in jackets, lack of cooling

water and overloading, tracking from the first two causes seldom occurs. Troubles arising from air pockets are eliminated by periodical opening; of the vent cocks on the cylinder heads. When for any reason the cooling water supply to part or all of the cylinders fails, the engine should not be kept in operation long while the trouble is being corrected. Cracks that are due to overloading usually result from local overloading, caused by trouble with the fuel pumps or some other conditions that ; cause one or more cylinders to quit firing.

Cracked crankshafts. When a crankshaft does crack the fracture usually occurs in a crank pin or crankweb. If one bearing wears down more than the others the shaft bends, which results in breakage.

Vibration. The amount of vibration of an engine and of the ship's hull in which it is installed depends on how well the reciprocating and rotating masses in the engine are balanced and the position of the engine relative to a nodal point in the hull. Normally Diesel engines run with very little vibration, but it sometimes happens, that the engine has a critical speed, at which the twisting impulses, imparted to the crankshaft by the pressure acting on the piston, coincide with the natural period of vibration of the crankshaft. At this speed violent vibration occurs. This critical speed should be passed through as rapidly as possible when manoeuvring and the engine should always operate below or above these speeds.

PREPARATION UNDER NORMAL CONDITIONS

If the engine has been at stand-by for only a short period of time, the procedure is as follow

1. Disengage the turning gear.
2. Blow off the starting air system to remove any water and lubricate all valves in the system.
3. Blow off the pneumatic starting system to remove any water.
4. Start the lubricating oil pumps for the following main engine camshaft and governor amplifier turbochargers.
5. Check the oil pressure and the flow of oil through the system, oil sign glasses on the main engine and the turbochargers
6. Check that the cylinder lubricators are filled with the correct of oil, and that they deliver oil when operated manually.

7. Start the cooling water pumps and check the pressure.
8. Lubricate bearings and finks in the manoeuvring mechanism.
9. Set the shut-off valve in the "Service" position and open the air supply to the pneumatic starting system. The shut-off valve must be in the "Service" position when the ship is sailing and in the "Blocked" position during repairs.
10. Switch on the power for the electrical equipment in the manoeuvring system.
11. During the following checks, the valve to the starting air distributor must be closed, the order selector must be in the "Emergency Running* position, and the camshaft must be in the outer position for AHEAD or ASTERN. Check that the index for all fuel pumps corresponds to the different positions of the manoeuvring handle at the end of the check, open the valve to the starting air distributor.
12. Start the fuel oil primary pump and the nozzle cooling pump and check the pressures.
13. Vent the fuel oil valves.
14. Slowly turn the engine crankshaft one revolution with the open indicator cocks to prevent damage arising as a result of collections of lubricating oil, fuel oil or water on the piston crowns. Slow-turning is achieved by setting the telegraph handle at the desired direction of rotation and the manoeuvring handle in the START position. When the crankshaft has turned one revolution, pull the manoeuvring handle back to the STOP position. Slow-turning of the engine must always be carried out as late as possible before starting and in all cases at a maximum of half an hour before the first manoeuvres are carried out.
15. Close the indicator cocks.
16. Set the order selector in the desired position.
17. Inform the bridge that the engine is ready.

STARTING SYSTEM

The Diesel engine is started by compressed air of a pressure not exceeding 30 kg/sq.cm. A warm engine may be started at a minimum air pressure of 9 kg/sq.cm.

The starting system consists of a master starting valve, loading valve, air distributor, starting valve per cylinder, control post, air reservoirs and piping.

The advantage of this Diesel engine consists in the presence of a thoroughly developed starting system. First, the engine is cranked with the aid of air, then, air continues to flow into cylinders together with fuel.

Such a system ensures rapid starting and reversing and reduces considerably the quantity of starting air required.

The engine is controlled with the aid of one handle - feature very appreciable in operation. The control handle allows starting, stopping, reversing the engine and varying fuel feed. The engine features an interlocking device. The, latter bound to the control levers keeps the engine running under given duty conditions.

The instrument panel mounted above the control handle carries the following instruments: water, oil fuel and starting air pressure gauges, distance temperature gauges and tachometer.

The engine is reversed with the aid of the engine starting and stop handle. The crankshaft changes direction of rotation after the camshaft changes its position and the drum of the air distributor turns.

Lubricating oil to engine bearings, piston cooling oil and high pressure oil for cylinder lubrication comes from a circulation lubrication system, featuring a gear pump, coarse and fine filters and an oil cooler cooled by sea water. The cylinders are lubricated by two or three plunger pumps supplying exact amounts of oil.

TROUBLE SHOOTING

The following includes a brief description of some of the stoppages that can arise and their causes.

Difficulties in Starting.

The crankshaft turns too slowly or unevenly on starting air.

Cause:

1. the pistons in the starting air distributor are sticking.
2. the starting valves in the cylinder covers are defective.
3. incorrect setting of the starting air distributor.

The crankshaft turns on starting air, but there is no fuel injection because the pump index is too low.

Cause:

1. sluggishness the manoeuvring gear.
2. the piston in the stop cylinder is not moving either because of sluggishness or because a "shut-down" function has not been cancelled.
3. the manoeuvring air pressure to the governor is too low.
4. failure in the governor or amplifier.
5. incorrect setting of manoeuvring gear.

Fuel oil is being injected, but there is no ignition.

Cause:

1. water in the fuel oil.
2. the fuel valves or the atomizers are defective.
3. the compression pressure during start is too low.
4. fuel injection taking place too late.
5. the viscosity of the fuel oil is too high.

DIFFICULTIES DURING OPERATION

The exhaust temperature increases on one individual cylinder.

Cause:

1. defective fuel valve or atomizer.
2. leakage in exhaust valve.
3. blow-lack or other leakage in combustion chamber.
4. incorrect setting of fuel pump cam.

The exhaust temperature decreases on one individual cylinder.

Cause:

1. air pockets in the fuel pump and/or fuel valve.
2. the spindle in the fuel valve is sticking.
3. the suction valve in the fuel pump is defective.
4. a fuel pump piston is sticking or is leaking.

Smoky exhaust at increased load.

Cause:

1. the speed of the turhochargcr docs not correspond to the speed of the crankshaft.
2. the supply of combustion air is inadequate.
3. defective fuel valves or atomizers.
4. failure in nozzle cooling.
5. fire in scavenging air box.

PROPELLING MACHINERY

The propelling machinery consists of four supercharged single-acting non-reversible, four-stroke, trunk type OEM' Pie-stick Diesel engines.

The two forward 12-cylinder engines operate each shaft over reduction gears, being situated in front of these gears, while the two after 16-cylinder engines are arranged aft of the gears.

Two engines are connected to one reduction gear through Vulcan hydraulic clutches, making it possible during navigation to engage or disengage either engine if required from the engine room master control console.

The four main propulsion engines are equipped to burn heavy fuel oil. Each engine has its own independent fuel system consisting of pump heaters, automatic viscosity regulating and other devices to ensure proper pumping and combustion of the fuel.

The main reduction gears were designed and manufactured by Fairfield and are of the single-reduction type, the power of the two Pielstick engines being combined and the torque transferred to the propeller shaft. The gears reduce the engine speed from 620 r.p.m. to 115 r.p.m. at the shaft.

The pinion is of nickel chrome, molybdenum steel and the bull gear of cast iron with a shrunk-on steel ring.

Lubrication of the gears is by two electrically driven oil pumps which transfer the lubricating oil from the sump tank via oil cooler to the gravity tanks located in the engine room trunk.

From the gravity tanks the oil is gravitated to the bearings and gears.