Azərbaycan Dövlət Dəniz Akademiyasında 2022/2023-cü tədris ilində
050619 – "Gəmi energetik qurğularının istismarı mühəndisliyi"
ixtisası üzrə dövlət imtahanının
SUALLARI:

1. "GƏMİ KÖMƏKÇİ MEXANİZMLƏRİ, SİSTEMLƏRİ VƏ ONLARIN İSTİSMARI"

1. "SHIP AUXILIARY MECHANISMS, SYSTEMS AND THEIR OPERATION"

1. Ship steering devices, their varieties and operation.
2. Manual, mechanical and hydraulic transmissions installed on the vessel.
3. Active rudders, their varieties and auxiliary rudders.
4. Anchor devices and their varieties, anchor chains and Register requirements for them.
5. Windlass, capstans and their devices.
6. Ship lifting mechanisms and their operation.
7. Ventilation systems on the ship, their constructions and principle of operation.
8. Fire extinguishing systems and alarm.
9. Water fire extinguishing system and pumps used.
10. Chemical and steam fire extinguishing system.
11. Water supply system, sanitary system and pumps used.
12. Sewage and wastewater system, pumps used.
13. Cargo, cleaning systems and pumps used on tankers.
14. Inert gas system. Cargo heating system on tankers.
15. Tanker tank washing system and washing machines used.
16. Definition of elements of ship systems.
17. Ballast, trim, roll systems and pumps used on icebreakers.
18. Compressed air system, air compressors and Register requirements for them.
19. Constructions of gear and screw pumps and their principle of operation.
20. Centrifugal pumps and their operating principle.
21. Constructions of oil and fuel separator and their principle of operation.
22. Drainage system on ships, pumps used in this system and emergency drainage pumps.
23. Sub-sludge water treatment separator and requirements of the Register for them.

24. Mooring mechanisms and their design.

ЛИТЕРАТУРА:

1. V.O.Osmanov, S.N. Əliyev “Gəmi mərkəzdənqaçma nasoslarının hesabı”. Baku-2001, ADDA “Tİ-MEDİA” mətbəəsi -143 səh.
2. A.M.Te. Эксплуатация судовых вспомогательных механизмов, систем и устройств: Учеб. Пособие / A.M. Te. – Владивосток: Мор. гос. ун-т, 2014. – 178 с.
3. В.М. Харин. Судовые гидравлические рулевые машины-Одесса <<ФЕНİКС,2005-277стр.
4. В.М. Харин В.И.Скоморохов. Судовые ввоздушные компрессоры. Одесса, ФЕНİКС 2003-144стр.
5. Международная конвенция МАРПОЛ 73/78. По предотвращению загрязнения с судов. Санкт-Петербург ЗАО ЦНИИМФ-2000.
6. В.В.Завища Б.Г. Декин «Судовые вспомогательные механизмы и системы»-Москва, «Транспорт», 1984-358 стр.
7 .Е.Н.Шиняев и другие «Судовые вспомогательные механизмы». Москва «Транспорт» 1984.
8. О.Г. Колесников «Судовые вспомогательные механизмы и системы» - Москва, «Транспорт»-1977г.

2. “GƏMİ KÖMƏKÇİ BUXAR QAZNLARI, BUXAR VƏ QAZ TURBİNLƏRİ”

2. "SHIP AUXILIARY STEAM BOILERS, STEAM AND GAS TURBINES".

1.Purpose, construction, principle of operation and basic elements of ship water-tube boilers.
2. Purpose, construction, principle of operation and main elements of ship's firetube boilers.
3. Design of ship utilization boilers.
4. Purpose, classification and main characteristics of boilers.
5. Fuels for marine boilers and their main characteristics. Burning fuel in boilers. Conditions of combustion.
6. Principle of operation and construction of the mechanical nozzle.
7. Heat balance of steam boilers and boiler efficiency.
8. Boiler fittings.

9. Control and measuring devices (instruments)of boilers.
10. Boiler water quality indicators.
11. Water regime of boilers, prevention of scale formation and corrosion.
12. Alarm systems and protection of ship boilers.
13. Construction and principle of operation of the Laval turbine.
14. Construction and principle of operation of Curtis turbine.
15. Construction and principle of operation of active multistage turbines.
16. Construction and principle of operation of reactive multistage turbines.
17. Purpose, principle of operation and schemes of the gas turbine engine.
18. Construction of marine thermal oil boilers.
19. Technological scheme of a refrigerating machine operating on the reverse Carnot cycle diagram of the machine in the field of wet steam and its refrigeration coefficient.
20. Technological scheme and diagram of a refrigeration unit with a temperature control valve and a regenerative heat exchanger.
21. Classification and principle of operation of piston compressors of refrigeration machines.
22. Theoretical and actual indicator diagram of piston compressors of refrigeration machines.
23. TRV of refrigeration plant with internal equalization.
24. Testing of refrigeration plant under pressure.

ЛИТЕРАТУРА:

1. Корнилов Э.В., Бойко П.В., Голофастов Э.И. Вспомогательные, утилизационные, термомасляные котлы морских судов. Одесса, «Экспресс реклама», 2008. 240 с.
2. Денисенко Н.И., Костылев И.С. Судовые котельные установки. СПб, 2005. 285 с.
3. Бойко Е.А. «Паровые котлы» Красноярск 2005 136 с.- internetdən çıxarış
4. Енин В.И., Денисенко Н.И., Костылев И.С. Судовые котельные установки. Транспорт, 1993. 215 с.
5. В.И.Енин«Судовые паровые котлы» М.Транспорт 1984г. 248 с.
6. А.И. Волков Б.У.Судерев Судовые паровые котлы Ленинград «Судостроение» 1988г-. 136с.
7. Верете, А.К. Дельвинг. Судовые пароэнергетические установки и газовые турбины Москва «Транспорт» 1982г.- 358с.

3. “GƏMİ DAXİLİ YANMA MÜHƏRRİKLƏRİNİN KONSTRUKSİYASI”

3. "CONSTRUCTION OF MARINE (SHIPBOARD) INTERNAL COMBUSTION ENGINES"

1.General devices of marine two-stroke and four-stroke internal combustion engines (ICE). Marking of marine internal combustion engines by existing standards and basic requirements to marine internal combustion engines.

2. Indicator diagram and operating principle of four-stroke diesel engines.

3. indicator diagram and principle of operation of two-stroke diesel engines.

4. Foundation frames and frame bearings.

5. Construction of crankcases, cylinder blocks, block crankcases and cylinder bushings.

6. Cylinder heads for two-stroke and four-stroke engines.

7. Pistons of trunk and crosshead engines.

8. Compression and oil removal rings.

9. Piston pins, crosshead assemblies and piston rods.

10. Connecting rods and connecting rod bolts.

11. Crankshafts.

12. Schemes of gas distribution mechanisms. Valve movement mechanisms.

13. Inlet and outlet valves.

14. Gas distribution shafts.

15. Schemes of supercharging and blowing systems of marine internal combustion engines.

16. Schemes of the fuel system of marine internal combustion engines operating on light fuel, their main elements and purpose.

17. Fuel supply systems with individual fuel pumps.

18. Schemes of the fuel system of marine diesel engines operating on heavy fuel and their main elements.

19. Nozzles of marine diesel engines.

20. High pressure fuel pumps.

21. Low pressure fuel pumps, their purpose, types and construction.

22. Schemes of lubrication systems and their elements. Oil pumps, oil filters and oil coolers.

23. Schemes of cooling systems. Water pumps, water coolers and thermostats.

24. Starting and reversing systems.

ЛИТЕРАТУРА:

1. И.В.Возницкий. «Судовые двигатели внутреннего сгорания». М. Моркнига. Том-1, 2008 г, 282 с.
2. Возницкий И.В., Михеев Е.Г. Судовые дизели и их эксплуатация. Учеб. для морех. училищ. 2-е изд., перераб. и доп. – М.: Транспорт, 1990. 360 с.
3. Самсонов В.И., Худов Н.И. Двигатели внутренного сгорания морских судов. Учебник для высш. учеб. заведений. –2-е изд., перераб. и доп. – М.: Транспорт, 1990. 368 с.
4. Возницкий И.В., Михеев Е.Г., «Судовые дизельные установки». г. Ленинград, «Мортранс», 1985. 362стр.
5. «Судовые двигатели внутреннего сгорания» Возницкий И.В., Чернявская Н.Г., Михеев Е.Г., Изд. 2-е переработанное и дополненное. Учебник для мореходный училищ. – М:Транспорт, 1975-415 с.
6. Миклос А.Г., Чернявская Н.Г. «Судовые двигатели внутреннего сгорания» Л: Судостроение, 1971 – 400с.

4. “GƏMİ DAXİLİ YANMA MÜHƏRRİKLƏRİNİN NƏZƏRİYYƏSİ”

4. "THEORY OF MARINE INTERNAL COMBUSTION ENGINES".

1. Brief history of the development of marine internal combustion engines, their classification and basic concepts.
2. Excess air ratio. Combustion products in diesel engines.
3. Fuels used in marine diesel engines, the average elementary composition of fuel, the highest and lowest heat of combustion of fuel.
4. The change of pressure in the cylinder during the filling (suction) process. Definition of filling.
5. Change in pressure and polytrope index during compression. Selection of compression ratio for diesel engines. Calculation of the compression process.
6. Pressure change during combustion in diesel engines. Determination of pressure and temperature at the end of the combustion process.
7. Analysis of the combustion process according to a detailed indicator diagram (combustion periods).

8. Change of pressure and polytropy index during the expansion process. Determination of pressure and temperature at the end of the expansion process.
9. Pressure change during the exhaust process, free and forced exhaust in two-stroke and four-stroke engines
10. Indicator power, indicator efficiency. and specific indicator fuel consumption of the engine. The average pressure of mechanical losses and the average effective pressure of the engine.
11. Effective power, mechanical efficiency and effective efficiency of the engine. Specific effective and hourly engine fuel consumption.
12. Comparative performance and thermal balance of engine.
13. Determination of path, speed and acceleration of piston.
14. Deployment of the indicator diagram of a four-stroke engine according to the Brix method. Determination of the pressure force of gases according to the indicator diagram.
15. The force of inertia of reciprocating moving masses and the graph of the change of this force depending on the angle of rotation of the crankshaft.
16. Determination of total (moving) force in crosshead two-stroke and trunk four-stroke engines.
17. Determination of normal force in crosshead two-stroke and trunk four-stroke engines.
18. Determination of radial and tangential forces in two-stroke and four-stroke engines acting on the crank neck of the crankshaft.
19. Torque and overturning torque acting in crank mechanism, torque for one cylinder. Determination of total torque in multi-cylinder engines.
20. The condition of balancing a single-cylinder engine. Balancing the centrifugal force of inertia, inertia forces of the first and second levels in a single-cylinder engine.
21. Purpose of the waters used in steam boilers. Waters used on ships.
22. Settling and separation of fuel.
23. Oils used in diesel engines, their types and uses.
24. Changing the quality of oils during operation.

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1. A.Ş.İsmayılov. Gəmi daxili yanma mühərriklərinin nəzəriyyəsi. Dərslik. Bakı, ADDA, 2018. 370 s.

2. И.В.Возницкий, А.С.Пунда. «Судовые двигатели внутреннего сгорания». М. Моркнига. Том-2, 2008 г, 470 с.
3. İsmayılov A.Ş., Sambur H.O., Əliyev S.N., "Gəmi daxili yanma mühərriklərinin hesabı". Dərs vəsaiti. Bakı Təhsil PNM 2003, 146 s.
4. А.Г.Миклос, Н.Г.Чернявская «Судовые двигатели внутреннего сгорания». Судостроение 1971 г, 400 с.
5. В.У.Семенов, Н.Н.Худов. «Двигатели внутреннего сгорания морских судов». М.Транспорт, 1990. 360 с.
6. И.В.Возницкий, С.В.Камкин, В.П.Шмелев, В.Ф. Осташенков. «Рабочие процессы судовых дизелей» М.Транспорт, 1979, 208 с.

5. "GƏMİ ENERGETİK QURĞULARININ TEXNİKİ İSTİSMARI"
5. "Technical operation of ship power plants"

1. Preparation of the internal combustion engine for operation. Start-up of the internal combustion engine and maintenance during operation.
2. Preparation of systems (water, oil, fuel and compressed air) for operation and maintenance during operation.
3. Preparation of the internal combustion engine for maneuvers and for stopping.
4. Short-term and long-term stopping of internal combustion engine and maintenance during standing.
5. Requirements for the ship's technical facilities during operation.
6. Distribution of loads between ICE cylinders and their regulation.
7. Checking the condition of the moving parts of the diesel engine.
8. Maintenance of the oil system.
9. Maintenance of the cooling system.
10. Maintenance of the fuel system.
11. Maintenance of the starting and supercharging system.
12. Inspection of power plants and technical means in the engine room.
13. Preparation of the internal combustion engine for work after the repair of the vessel.
14. The cause and definitions of splitting in the crankshaft of a diesel engine.
15. Measuring and determining ellipse, taper and barrel condition in the piston pin and cylinder bushing.
16. Ensuring safety in the engine room.
17. Maintenance of marine diesel engines.

18. "Pompage" in the Gas Turbo Supercharger of the internal combustion engine cause and ways to eliminate them.
19. Operation of the internal combustion engine in case of sea waves.
20. Operation of the SPP during fouling of the vessel's hull.
21. Operation of the internal combustion engine in case of failure of the speed controller.
22. Operation of the internal combustion engine when the closed cooling system is forced to switch to the seawater system.
23. Environmental protection in the operation of the Ship power plant.
24. Checking and inspection of signs of normal operation of the diesel after start-up.

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1. Ю.Г.Дейнего. Эксплуатация судовых энергетических установок, механизмов и систем. Практические советы и рекомендации. / Ю.Г.Дейнего. – М.: МОРКНИГА, 2012, 340 с.
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3.С.В. Камкин.,И.В. Возницкий., В.П. Шмелев Эксплуатация судовых дизелей. Транспорт 1990. 343с.
4. В.С. Гаврилов , С.В.Камкин , В.П. Шмелов Техническая эксплуатация судовых дизельных установок . 1975. 296 с.

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“Gəmi energetik gurguları”
kafedrasının müdiri: dos. A.Ş. İsmayılov