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АНГЛИЙСКИЙ ЯЗЫК

Учебно-методическое пособие
и контрольные задания
для курсантов заочной и заочной ускоренной
форм обучения
по специальности 26.05.07
«Эксплуатация судового оборудования
и средств автоматике» 1-4 курсов

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Учебно-методическое пособие и контрольные задания составлены на основе рабочего учебного плана заочной и заочной ускоренной форм обучения БГАРФ ФГБОУ ВО «КГТУ» по специальности 26.05.07 «Эксплуатация судового оборудования и средств автоматики».

Рассмотрены и одобрены на заседании кафедры иностранных языков факультета гуманитарной подготовки ФГБОУ ВО «КГТУ».

Печатается по решению редакционно-издательского совета Балтийской государственной академии рыбопромыслового флота.

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1. ОБЩИЕ ОРГАНИЗАЦИОННО-МЕТОДИЧЕСКИЕ УКАЗАНИЯ

Методические рекомендации и контрольные задания составлены на основе рабочего учебного плана заочной и заочной ускоренной форм обучения БГАРФ ФГБОУ ВО «КГТУ» в соответствии с требованиями Федерального государственного образовательного стандарта по направлению подготовки (специальности) 26.05.07 «Эксплуатация судового электрооборудования и средств автоматики», утвержденного приказом Минобрнауки России от 15 марта 2018 г. № 193 (далее – ФГОС ВО) и Международной конвенции о подготовке и дипломировании моряков и несении вахты (далее ПДНВ-78/95) (раздел А-III/6).

Требования к результатам освоения программы специалитета по ФГОС ВО

Дисциплины	Код и наименование компетенции	Индикаторы достижения компетенции
Английский язык	УК-4. Способен применять современные коммуникативные технологии, в том числе на иностранном(ых) языке(ах), для академического и профессионального взаимодействия	УК-4.1. Использует современные информационно-коммуникативные средства для коммуникации. УК-4.3. Демонстрирует умение вести обмен профессиональной информацией в устной и письменной формах на английском языке
Профессиональный английский язык	УК-4. Способен применять современные коммуникативные технологии, в том числе на иностранном(ых) языке(ах), для академического и профессионального взаимодействия	УК-4.1. Использует современные информационно-коммуникативные средства для коммуникации. УК-4.3. Демонстрирует умение вести обмен профессиональной информацией в устной и письменной формах на английском языке
Деловой английский язык	УК-4. Способен применять современные коммуникативные технологии, в том числе на иностранном(ых) языке(ах), для академического и профессионального взаимодействия	УК-4.1. Использует современные информационно-коммуникативные средства для коммуникации. УК-4.3. Демонстрирует умение вести обмен профессиональной информацией в устной и письменной формах на английском языке
	ПК-17. Способен организовывать профессиональное обучение и аттестацию обслуживающего персонала и специалистов	ИД-1 _{ПК-17} . Умеет организовать профессиональное обучение обслуживающего персонала и специалистов. ИД-2 _{ПК-17} . Знает методы и порядок аттестации обслуживающего персонала и специалистов

Международная конвенция ПДНВ-78/95 с манильскими поправками
Таблица А-III/6

*Спецификация минимальных стандартов компетентности
для электромехаников*

Функция: электрооборудование, электронная аппаратура и системы управления на уровне эксплуатации

Колонка 1	Колонка 2	Колонка 3	Колонка 4
Сфера компетентности	Знание, понимание и профессиональные навыки	Методы демонстрации компетентности	Критерии для оценки компетентности
Использование английского языка в письменной и устной форме	Достаточное знание английского языка, позволяющее лицу командного состава использовать технические пособия и выполнять свои обязанности	Экзамен и оценка результатов практического инструктажа	Пособия на английском языке, относящиеся к обязанностям лица командного состава, правильно понимаются. Связь четкая и понятная

Основной целью дисциплин «Английский язык», «Профессиональный английский язык», «Деловой английский язык» является формирование иноязычной коммуникативной компетенции, предполагающей усвоение умений и навыков в области аудирования, чтения, устной и письменной речи, а также связанными с ними аспектами языка (фонетики, лексики и грамматики) для решения задач профессиональной, бытовой и социально-культурной деятельности инженера-электромеханика.

В результате освоения дисциплины обучающийся должен:

- владеть четырьмя видами речевой деятельности (аудирование, чтение, говорение, письмо) на уровне В2 по общеевропейской шкале уровней владения иностранными языками, необходимом для коммуникации без искажения смысла при устном и письменном общении по профессиональной проблематике;
- лексический минимум – 4 000 единиц (бытовая, общепрофессиональная, узкоспециальная лексика);
- владеть английским языком, позволяющим инженеру-электромеханику использовать технические пособия и выполнять свои обязанности согласно требованиям Международной конвенции ПДНВ-78 (таблица А-III/6);
- понимать и применять стандартные фразы ИМО (IMO Standard Marine Communication Phrases (SMCP));
- уметь использовать английский язык для академического взаимо-

действия и дальнейшего профессионального самообразования.

2. ПРИМЕРНЫЙ ТЕМАТИЧЕСКИЙ ПЛАН ЗАНЯТИЙ

Наименование разделов и тем программы дисциплины	Практические занятия	
	Очно-заочная форма	Заочная уск. форма
Английский язык (324 часа)		
I курс		
144 часа		
	10 (1/1) ЭК	8 (1/1) ОК
Тема 1. Вводный фонетический курс	2	
Тема 2. Семья, биография	2	1
Тема 3. Времена года и погода	2	1
Тема 4. Обучение в морском ВУЗе	2	1
Тема 5. Экипаж судна	2	1
72 часа		
	6 (1/1) ЗК	
Тема 1. Судовая практика	2	
Тема 2. На выставке (типы судов)	2	
Тема 3. Посещение России	1	
Тема 4. Открытие Антарктики	1	
II курс		
108 часов		
	6 (2/1) ОК	
Тема 1. General description of a ship	2	
Тема 2. The hull	1	
Тема 3. Types of merchant ships	2	
Тема 4. Keeping underway watches	1	
Профессиональный английский язык (252 часа)		
72 часа		
	8 (2/2) ЗК	8 (1/2) ЗК
Тема 1. Actions during accident on board	2	2
Тема 2. Marine environmental pollution	2	2
Тема 3. Basic construction of a diesel engine	2	2
Тема 4. IMO Standard Marine Communication phrases	2	2
III курс		
72 часа		
	8 (3/1) ЗК	8 (2/1) ЗК
Тема 1. Electricity	2	2
Тема 2. DC generators	2	2
Тема 3. AC generators	2	2
Тема 4. DC motors	2	2

108 часов		
	12 (3/2) ОК	12 (2/2) ОК
Тема 1. AC motors	2	1
Тема 2. Ship's power plant and auxiliary electrical equipment	2	2
Тема 3. Maintenance and troubleshooting	2	1
Тема 4. Diesel engine	2	1
Тема 5. Engine-room department	2	1
Тема 6. Conventions	2	1
Деловой английский язык (252 часа)		
IV курс		
108 часов		
	6 (4/1) ОК	6 (3/1) ОК
Тема 1. Power Distribution system. Диалоги	2	2
Тема 2. Emergency Power supply. Диалоги	2	2
Тема 3. Insulated and earthed neutral system. Диалоги	1	1
Тема 4. Significance of Earth faults. Диалоги	1	1
144 часа		
	6 (4/2) ЭК	2 (3/2) ЭК
Тема 1. Distribution circuit breakers and transformers. Диалоги	2	1
Тема 2. Electric cables. Диалоги	2	1
Тема 3. Shore supply connection. Диалоги	2	

3. ПЕРЕЧЕНЬ РЕКОМЕНДУЕМОЙ ЛИТЕРАТУРЫ

Основная литература

1. Китаевич, Б.Е. Учебник английского языка для моряков: учебник / Б.Е. Китаевич и др. – М.: РосКонсульт, 2003.
2. Рубцова А.И., Гогина Н.А. Деловой английский язык для судовых механиков. – М.: ТрансЛит, 2014.
3. Ступина Л.Г., Усольцева Г.М. Английский язык для судовых электромехаников: Введение в электромеханику. = English for electrical engineers: Introduction to electrical engineering: учеб. пособие / Л.Г. Ступина, Г.М. Усольцева. – Калининград: Изд-во БГАРФ, 2018.
4. Пенина И.П., Емельянова И.С. Английский язык для морских училищ: учеб. пособие / И.П. Пенина, И.С. Емельянова; 2-е изд. – М.: Высшая школа, 2001.
5. Ступина Л.Г., Ковтун Л.Н. Английский язык для судовых электромехаников: электрическая распределительная система. = English for electrical engineers: Electrical distribution system: учеб. пособие / Л.Г. Ступина, Л.Н. Ковтун. – Калининград: Изд-во БГАРФ, 2018.
6. Потапова Л.Н., Ботяновская С.П. Методика развития устной речи на английском языке. Часть 1. – Калининград: Изд-во БГАРФ, 2009.
7. IMO Standard Marine Communication phrases: manual/Odessa National Maritime Academy: N.O. Ivasyuk. – Odessa: Feniks, 2013.

Дополнительная литература

1. Гогина Н.А. Практическая грамматика английского языка для моряков: сб. упражнений. – М.: ТрансЛит, 2007.
2. Труханова Н.Л., Кравченко Н.А. Английский язык судовой электроэнергетики для моряков. – Одесса: Феникс, 2003.
3. Потапова Ю.Б. Engineering Paper Load. = Деловая переписка для судовых механиков. – СПб.: Изд-во ГУМРФ им. адм. С.О. Макарова, 2013.
4. Allister Nisbet, Anna Whitcher Kutz, Catherine Logie Marlins. English for Seafarers. Study Pack 1. Study Pack 2. – Edinburgh, UK: Marlins, 1998.
5. P.C. van Kluijven The international maritime language programme. – Netherlands: Alk&Hajnen Publishers, 2007.
6. Международная конвенция о подготовке и дипломировании моряков и несении вахты 1978 года (ПДМНВ-78) с поправками (консолидированный текст) [Текст] = International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978 (STCW 1978), as amended (consolidated text) : юридический документ / ЦНИИМФ, Отдел безопасности мореплавания ; отв. исполн. В. Я. Васильев. – Введ. с 28.04.1984 года: с поправками по состоянию на сентябрь 2016 года. – СПб.: ЗАО ЦНИИМФ, 2016.

4. СОДЕРЖАНИЕ ПРОГРАММЫ ДИСЦИПЛИНЫ И МЕТОДИЧЕСКИЕ УКАЗАНИЯ К САМОСТОЯТЕЛЬНОМУ ИЗУЧЕНИЮ

АНГЛИЙСКИЙ ЯЗЫК 1 курс 1 семестр

(сессия 1/1 для студентов очно-заочной формы обучения и
сессия 1/1 для студентов заочной ускоренной формы обучения)

Учебная литература

1. Китаевич, Б.Е. Учебник английского языка для моряков: учебник / Б.Е. Китаевич и др. – М.: РосКонсульт, 2003.
2. Гогина Н.А. Практическая грамматика английского языка для моряков: сб. упражнений. – М.: ТрансЛит, 2007.

Задание I

Выполнить контрольную работу № 1.

См. методические указания и контрольные задания.

Задание II

Вводный фонетический курс

Проработайте устно материал введения (с. 8-10), уроки 1-8 (транскрипция, правила чтения) и все упражнения к ним по учебному пособию:

Китаевич, Б.Е. Учебник английского языка для моряков: учебник / Б.Е. Китаевич и др. – М.: РосКонсульт, 2003.

Задание III

Грамматика

1. Изучите по учебнику раздел «Грамматические пояснения» в уроках 1-12 по следующим темам:

- Понятие об артикле **a/an, the**.
- Глагол **to be**, конструкция **there is/are**.
- Предлоги места, направления, времени.
- Местоимения, множественное число существительных, **some/any, many/much, few/little**.
- Виды вопросов.
- Числительные (количественные и порядковые).
- Степени сравнения прилагательных.
- Времена **Present Simple, Present Continuous, Past Simple**.
- Модальные глаголы **must, can, may** и их эквиваленты.

2. Выполните следующие упражнения письменно:

стр. 22 упр. 17	стр. 61 упр. 15	стр. 110 упр. 30
стр. 32 упр. 20, 23	стр. 69 упр. 35	стр. 113 упр. 6
стр. 33 упр. 28	стр. 76 упр. 13	стр. 120 упр. 25
стр. 42 упр. 28	стр. 84 упр. 33	стр. 127 упр. 11
стр. 53 упр. 23	стр. 90 упр. 14	стр. 133 упр. 28
стр. 54 упр. 27	стр. 97 упр. 34	стр. 135 упр. 5
стр. 58 упр. 8	стр. 102 упр. 9	стр. 142 упр. 21

Задание IV

Лексика

1. Составьте и выучите монологические высказывания по темам:

- About Myself
- Seasons and weather
- Marine Academy
- The Ship's Crew

2. Выполните следующие упражнения письменно:

стр. 40 упр. 18	стр. 81 упр. 24	стр. 117 упр. 13 (а)
стр. 52 упр. 19	стр. 94 упр. 25	стр. 130 упр. 17
стр. 65 упр. 25	стр. 106 упр. 18	стр. 139 упр. 13

На зачете/экзамене курсант должен представить рабочую тетрадь со словарем и выполненными упражнениями.

1 курс 2 семестр

(сессия 1/2 для студентов очно-заочной формы обучения)

Учебная литература

1. Китаевич, Б.Е. Учебник английского языка для моряков: учебник / Б.Е. Китаевич и др. – М.: РосКонсульт, 2003.
2. Гогина Н.А. Практическая грамматика английского языка для моряков: сб. упражнений. – М.: ТрансЛит, 2007.

Задание I

Выполнить контрольную работу № 2.

См. методические указания и контрольные задания.

Задание II

Грамматика

1. Изучите по учебнику раздел «Грамматические пояснения» в уроках 13-26 по следующим темам:

- Будущее неопределенное и длительное время.
- Возвратные местоимения.
- Причастие II.
- Страдательный залог.
- Настоящее, прошедшее и будущее совершенное время.
- Определенный артикль с именами собственными.
- Согласование времен.
- Косвенная речь
- Эквиваленты модальных глаголов
- Конструкция Complex Object – «объектный падеж с инфинитивом».

2. Выполните следующие упражнения письменно:

стр. 145 упр. 6
стр. 151 упр. 21
стр. 154 упр. 6
стр. 160 упр. 21
стр. 163 упр. 5
стр. 170 упр. 19
стр. 175 упр. 8
стр. 181 упр. 24
стр. 194 упр. 22

стр. 199 упр. 10
стр. 206 упр. 26
стр. 210 упр. 7
стр. 216 упр. 21
стр. 219 упр. 6
стр. 220 упр. 7
стр. 227 упр. 21
стр. 231 упр. 7
стр. 238 упр. 22

стр. 252 упр. 19
стр. 254 упр. 3
стр. 257 упр. 10
стр. 266 упр. 3
стр. 275 упр. 22
стр. 278 упр. 8
стр. 284 упр. 23
стр. 287 упр. 6
стр. 293 упр. 20

Задание III

Лексика

1. Составьте и выучите монологические высказывания по темам:

- Shipboard training
- Our Country
- Types of Ships
- The discovery of the Antarctic

2. Выполните следующие упражнения письменно:

стр. 148 упр. 13
стр. 157 упр. 11
стр. 167 упр. 12
стр. 178 упр. 14
стр. 189 упр. 10

стр. 201 упр. 15
стр. 213-214 упр. 13
стр. 223 упр. 12
стр. 234 упр. 12
стр. 246 упр. 10

стр. 259 упр. 14
стр. 270 упр. 11
стр. 281 упр. 16
стр. 289 упр. 11

2 курс 3 семестр
(сессия 2/1 для студентов очно-заочной формы обучения)

Учебная литература

1. Рубцова А.И., Гогина Н.А. Деловой английский язык для судовых механиков. – М.: ТрансЛит, 2014.

Задание I

Выполнить контрольную работу № 6.

См. методические указания и контрольные задания.

Задание II

1. Проработайте устно следующие уроки и все упражнения к ним по учебному пособию:

Рубцова А.И., Гогина Н.А. Деловой английский язык для судовых механиков. – М.: ТрансЛит, 2014.

Lesson 3. General description of a ship (стр. 13-16)

Lesson 4. The hull (стр. 17-20)

Lesson 5. Types of merchant ships. Part I (стр. 21-23)

Lesson 6. Types of merchant ships. Part II (стр. 24-27)

Lesson 7. Keeping underway watches (стр. 28-32)

2. Составьте словарь к текстам.

3. Письменно выполните все упражнения к урокам.

4. Составьте краткие пересказы текстов пройденных уроков.

На зачете/экзамене курсант должен быть способен устно пересказать на английском языке содержание текстов, представить рабочую тетрадь со словарем и выполненными упражнениями.

ПРОФЕССИОНАЛЬНЫЙ АНГЛИЙСКИЙ ЯЗЫК

2 курс 4 семестр
(сессия 2/2 для студентов очно-заочной формы обучения и
1/2 для студентов заочной ускоренной формы обучения)

Учебная литература

1. Рубцова А.И., Гогина Н.А. Деловой английский язык для судовых механиков. – М.: ТрансЛит, 2014.

2. Потапова Л.Н., Ботяновская С.П. Методика развития устной речи на английском языке. Часть 1. – Калининград: Изд-во БГАРФ, 2009.

3. IMO Standard Marine Communication phrases: manual/Odessa National Maritime Academy: N.O. Ivasyuk. – Odessa: Feniks, 2013.

Задание I

Выполнить контрольную работу № 6.

См. методические указания и контрольные задания.

Задание II

1. Проработайте устно следующие уроки и все упражнения к ним по учебному пособию:

Рубцова А.И., Гогина Н.А. Деловой английский язык для судовых механиков. – М.: ТрансЛит, 2014.

Lesson 8. Actions of ship's crew members during accident on board (стр. 33-37)

Lesson 10. Marine environmental pollution (стр. 43-46)

Письменно выполните упр. 2, 3, 7, 8.

Потапова Л.Н., Ботяновская С.П. Методика развития устной речи на английском языке. Часть 1. – Калининград: Изд-во БГАРФ, 2009.

Lesson 4. Basic construction of a diesel engine (стр. 35-47)

Письменно выполните упр. 1, 4, 5, 6.

2. Составьте словарь к текстам.

3. Письменно выполните перевод стандартных фраз ИМО/IMO Standard Marine Communication phrases (взять у преподавателя).

4. Составьте краткие пересказы текстов пройденных уроков.

На зачете/экзамене курсант должен быть способен устно пересказать на английском языке содержание текстов, представить рабочую тетрадь со словарем и выполненными упражнениями.

3 курс 5 семестр

(сессия 3/1 для студентов очно-заочной формы обучения и сессия 2/1 для студентов заочной ускоренной формы обучения)

Учебная литература

1. Ступина Л.Г., Усольцева Г.М. Английский язык для судовых электромехаников: введение в электромеханику. = English for electrical engineers: Introduction to electrical engineering: учеб. пособие / Л.Г. Ступина, Г.М. Усольцева. – Калининград: Изд-во БГАРФ, 2018.

Задание I

Выполнить контрольную работу № 5.

См. методические указания и контрольные задания.

Задание II

1. Проработайте устно следующие уроки и все упражнения к ним по учебному пособию:

Ступина, Л.Г. Усольцева Г.М. Английский язык для судовых электромехаников: введение в электромеханику. – Калининград: Изд-во БГАРФ, 2018. – 99 с.

Unit 1. Electricity (стр. 5-12)

Unit 2. DC generators (стр. 14-23)

Unit 3. AC generators (стр. 25-33)

Unit 4. DC motors (стр. 35-43)

2. Составьте словарь к текстам.

3. Письменно выполните упражнения 2, 3, Review.

4. Составьте краткие пересказы текстов пройденных уроков.

На зачете/экзамене курсант должен быть способен устно пересказать на английском языке содержание текстов, представить рабочую тетрадь со словарем и выполненными упражнениями.

3 курс 6 семестр

(сессия 3/2 для студентов очно-заочной формы обучения и сессия 2/2 для студентов заочной ускоренной формы обучения)

Учебная литература

1. Ступина Л.Г., Усольцева Г.М. Английский язык для судовых электромехаников: введение в электромеханику. = English for electrical engineers: Introduction to electrical engineering: учеб. пособие / Л.Г. Ступина, Г.М. Усольцева. – Калининград: Изд-во БГАРФ, 2018.

Задание I

Выполнить контрольную работу № 6.

См. методические указания и контрольные задания.

Задание II

1. Проработайте устно следующие уроки и все упражнения к ним по учебному пособию:

Ступина Л.Г., Усольцева Г.М. Английский язык для судовых электромехаников: введение в электромеханику. – Калининград: Изд-во БГАРФ, 2018.

троемехаников: введение в электромеханику. – Калининград: Изд-во БГАРФ, 2018. – 99 с.

Unit 5. AC motors (стр. 46-54)

Unit 6. Ship's power plant and auxiliary electrical equipment (стр. 56-65)

Unit 7. Maintenance and troubleshooting (стр. 67-77)

Unit 8. Diesel engine (стр. 79-85)

Unit 9. Engine-room department. Conventions (стр. 86-91)

2. Составьте словарь к текстам.
3. Письменно выполните упражнения 2, 3, Review.
4. Составьте краткие пересказы текстов пройденных уроков.

На зачете/экзамене курсант должен быть способен устно пересказать на английском языке содержание текстов, представить рабочую тетрадь со словарем и выполненными упражнениями.

ДЕЛОВОЙ АНГЛИЙСКИЙ ЯЗЫК

4 курс 7 семестр

(сессия 4/1 для студентов заочной формы обучения)

(сессия 3/1 для студентов заочной ускоренной формы обучения)

Учебная литература

1. Ступина Л.Г., Ковтун Л.Н. Английский язык для судовых электромехаников: электрическая распределительная система. = English for electrical engineers: Electrical distribution system: учеб. пособие / Л.Г. Ступина, Л.Н. Ковтун. – Калининград: Изд-во БГАРФ, 2018.

2. Пенина И.П., Емельянова И.С. Английский язык для морских училищ: учеб. пособие / И.П. Пенина, И.С. Емельянова; 2-е изд. – М.: Высшая школа, 2001.

Задание I

Выполнить контрольную работу № 7.

См. методические указания и контрольные задания.

Задание II

1. Проработайте устно следующие уроки и все упражнения к ним по учебному пособию:

Ступина Л.Г., Ковтун Л.Н. Английский язык для судовых электромехаников: электрическая распределительная система. – Калининград: Изд-во БГАРФ, 2018. – 63 с.

- Unit 1. Power Distribution system (стр. 4-9)
Unit 2. Emergency Power supply (стр. 11-15)
Unit 3. Insulated and earthed neutral system (стр. 17-21)
Unit 4. Significance of Earth faults (стр. 23-27)

2. Составьте словарь к текстам.
3. Письменно выполните упражнения 1, 2, 4.
4. Составьте письменно краткие пересказы пройденных уроков.

Задание III

1. Проработайте устно следующие диалоги и выпишите лексику к ним по учебному пособию:

Пенина И.П., Емельянова И.С. Английский язык для морских училищ. – М.: Высшая школа, 2001.

- 1) Ситуативный диалог «Предварительное обсуждение ремонтной ведомости» (с. 118-119)
- 2) Ситуативный диалог «Общая информация относительно капремонта главного двигателя и крышек цилиндров» (с.123-124)
- 3) Ситуативный диалог «Ремонт парового котла» (с.129)
- 4) Ситуативный диалог «Ремонт главного распределительного щита» (с. 131)
- 5) Ситуативный диалог «Ремонт щита питания с берега» (с. 132)
- 6) Ситуативный диалог «Ремонт электромоторов» (с. 132)
- 7) Ситуативный диалог «Ремонт электрооборудования на камбузе. Лампы» (с. 133)

На зачете/экзамене курсант должен быть способен устно пересказать на английском языке содержание текстов, представить рабочую тетрадь со словарем и выполненными упражнениями.

4 курс 8 семестр

(сессия 4/2 для студентов заочной формы обучения)

(сессия 3/2 для студентов заочной ускоренной формы обучения)

Учебная литература

1. Ступина Л.Г., Ковтун Л.Н. Английский язык для судовых электромехаников: электрическая распределительная система. = English for electrical engineers: Electrical distribution system: учеб. пособие / Л.Г. Ступина, Л.Н. Ковтун. – Калининград: Изд-во БГАРФ, 2018.

2. Пенина И.П., Емельянова И.С. Английский язык для морских училищ: учеб. пособие / И.П. Пенина, И.С. Емельянова; 2-е изд. – М.: Высшая школа, 2001.

Задание I

Выполнить контрольную работу № 7.

См. методические указания и контрольные задания.

Задание II

1. Проработайте устно следующие уроки и все упражнения к ним по учебному пособию

Ступина Л.Г., Ковтун Л.Н. Английский язык для судовых электромехаников: электрическая распределительная система. – Калининград: Изд-во БГАРФ, 2018. – 63 с.

Unit 5. Distribution circuit breakers and transformers (стр. 29-35)

Unit 6. Electric cables (стр. 36-40)

Unit 7. Shore supply connection (стр. 42-45)

2. Составьте словарь к текстам.

3. Письменно выполните упражнения 1, 2, 4.

4. Составьте краткие пересказы текстов пройденных уроков.

Задание III

1. Проработайте устно следующие диалоги и выпишите лексику к ним по учебному пособию:

Пенина И.П., Емельянова И.С. Английский язык для морских училищ. – М.: Высшая школа, 2001.

- 1) Ситуативный диалог «Ремонт траловой лебедки и рулевой машины» (с. 136)
- 2) Ситуативный диалог «На борту судна» (с. 143)
- 3) Ситуативный диалог «В машинном отделении» (с. 144)
- 4) Ситуативный диалог «В бойлерной» (с. 145)
- 5) Ситуативный диалог «Опреснительная установка» (с. 146)
- 6) Ситуативный диалог «Туннель гребного вала» (с. 147)
- 7) Ситуативный диалог «В румпельном отделении» (с. 148, 154)
- 8) Ситуативный диалог «Аварийный дизель-генератор» (с. 149)

На зачете/экзамене курсант должен быть способен устно пересказать на английском языке содержание текстов, представить рабочую тетрадь со словарем и выполненными упражнениями.

5. ЗАДАНИЯ И МЕТОДИЧЕСКИЕ УКАЗАНИЯ ПО ВЫПОЛНЕНИЮ КОНТРОЛЬНЫХ РАБОТ

Студенты заочной формы обучения выполняют I вариант, если последняя цифра номера зачетной книжки нечетная, и II вариант, если четная.

Студенты заочной ускоренной формы обучения выполняют III вариант.

КОНТРОЛЬНАЯ РАБОТА № 1

ВАРИАНТ 1

Перепишите и письменно переведите текст на русский язык.

THE MARITIME UNIVERSITY OF SZCZECIN

The Maritime University of Szczecin is a state institution of higher engineering education. It was set up in January 1947 as the State Maritime School and in 1967 was transformed into the Maritime School of Higher Education, known as the Maritime University of Szczecin.

Teaching facilities include several simulators of the latest generation, well equipped laboratories and the modern research vessel Navigator XXI.

There are three faculties in the University: Navigation, Marine Engineering and Transport Engineering and Economics which offer full-time and part-time studies of first degree (engineer) and second degree (Master's). The graduate diplomas are recognized all over the world.

Graduates of the Maritime University choose professional careers as:

- navigating officers and ship's engineers of the merchant and deep-sea fishing fleets;
- specialists in port operations and maritime administration;
- managers in transport, forwarding and logistics.

Besides there are postgraduate studies and upgrading courses at the Marine Officers' Training Centre. The staff are mostly academic teachers holding both scientific degrees and titles, with practical experience.

The institute co-operates with a number of research institutions in Poland and abroad. The education of mariners requires thorough seamanship onboard training. This training takes place aboard the modern research/training vessel Navigator XX1, owned by the Maritime University of Szczecin. The vessel has two functions:

- practical onboard training of maritime university students;
- research in such fields as hydrography, hydrobiology, submarine geology.

There are cabins for the crew and cadets, besides the ship can comfortably accommodate research personnel in four cabins. Research data analyses are performed in shipboard labs fitted with computer network terminals.

1. Найдите и подчеркните в предложениях подлежащее и сказуемое. Определите время сказуемого.

1. Only well-qualified sailors can perform their duties properly.
2. When we approached the ferry some cars were rolling off it.
3. Some merchant ships operate as specialized ships.
4. During shipboard training the cadets will work under the direction of the ship's officers.

2. Составьте предложения. Помните о порядке слов.

1. She/much/doesn't/swimming/like/very
2. The gangway/met/watch/us/the/officer/at
3. The storm/ damages/ after/they/many/have
4. Rich/the country/materials/is/raw/in

3. Поставьте прилагательные в скобках в нужную форму.

1. My house is (far) from the port than your house.
2. Do you feel (good) today?
3. This liner is (big) than that vessel.
4. That was (interesting) lecture of the course.

4. Напишите следующие предложения в Past Simple и Future Simple, изменив обстоятельства времени.

1. The ship calls at many ports every year.
2. We launch the life-boats very seldom.

5. Поставьте следующие предложения в вопросительную и отрицательную форму.

1. They relieve each other of watch.
2. We can plot the route on charts.
3. He is familiar with all his duties in emergency situations.
4. They attended the nautical club last year.

6. Задайте 4 типа вопросов и вопрос к подлежащему.

We left this port three days ago.

7. Переведите на английский язык, употребляя модальные глаголы (may, can, must).

1. Можно мне войти?
2. Я не умею наносить курс судна на карту, но я должен научиться это делать.
3. Вы не должны опаздывать.
4. Могу я выключить свет в трюме?

ВАРИАНТ 2

Перепишите и письменно переведите текст на русский язык.

THE STORY OF THE KRUZENSHTERN

The famous four-masted bark “Kruzenshtern” was launched on 24th June 1926 in Tecklenborg Shipyards at Wesermunde in Germany and was christened (named) “Padua”. It became part of the commercial fleet of sailing ships owned by the Laeisz Company. Together with her sister ships the “Pamir”, “Passat” and “Pekin”, the “Padua” became one of the stars in the legendary “Flying P” line linking Europe with Chile and Australia.

These ships broke a number of speed records in competition with new cargo vessels. The “Padua” could take into her holds 4.000tons of bulk cargo. Every voyage there were 40—50 young men on board, those who had decided to become professional seamen. During the voyage they worked together with deckhands preparing themselves for their sea career.

Her last voyage as a cargo vessel the “Padua” made on the eve of World War II. After the Second World War the ship was handed over to the Soviet Union on the reparation basis and renamed the “Kruzenshtern” in honour of the famous Russian navigator and hydrographer, who was the first to circumnavigate the world under the Russian flag in the years 1803 and 1806.

In 1959—61 the ship was repaired - she was fitted with two 8—cylinder engines, 800hp each. The ship has an unlimited range of sailing. Her four masts carry 3,670sq. meters of sails. Her particulars are:

Length — 114,5m

Breadth — 14 m

Displacement 5.220 tons

Crew — 62, trainees – 120

Draft - 6,5 m

Speed, engine (maximum) - 11 knots

Sail - 18 knots

Since 1960-s she has been used for training cadets of the Soviet Fisheries schools and colleges. At the present time she is the training vessel of the Baltic Fishing Fleet State Academy in Kaliningrad, the southernmost Baltic port of Russia. The “Kruzenshtern” can accommodate the crew of 62, six tutors, and over 120 cadets (trainees). There are two classrooms for studies, a training navigation bridge and a chart-room and radio-room. There is a messroom and a library and a museum in the ship, as well as a sauna and showers and a bakery.

During their voyage the cadets get their practical training keeping watches at the wheel, making weather observations and learning safe navigation.

The ship has a competent crew, most of them graduates of the Kaliningrad Higher Marine Engineering College now the Academy.

1. Найдите и подчеркните в предложениях подлежащее и сказуемое. Определите время сказуемого.

1. The crew of our ship was rather skilled
2. Seamen of all countries of the world speak English when they are in a foreign port.
3. They were taking bearings of the nearest ship when we came.
4. A large number of merchant ships operate as specialized vessels.

2. Составьте предложения. Помните о порядке слов.

1. The navigating bridge/must/the navigators/on/keep watch/all
2. The Master/to replace/must/chief officer/during/be ready/the voyage.
3. The messroom/in/having/they/lunch/are.
4. Europe/to/the vessel/it/to get back/took/days/some

3. Поставьте прилагательные в скобках в нужную форму.

1. Oil is (light) than water.
2. Learning to drive was (difficult) thing in my life
3. This is (bad) winter for 10 years.
4. Who is (young) in your family?

4. Напишите следующие предложения в Past Simple и Future Simple, изменив обстоятельства времени.

1. The cadets plot the route on charts every lesson.
2. The sailors sometimes clean the holds.

5. Поставьте следующие предложения в вопросительную и отрицательную форму.

1. He is responsible for the safety of the ship.
2. They prepare the ship for the departure.
3. We will call at this port tomorrow.
4. He met me at the gangway.

6. Задайте 4 типа вопросов и вопрос к подлежащему.

The course of training at the Academy lasts 5.5 years

7. Переведите на английский язык, употребляя модальные глаголы (may, can, must).

1. Скоро может пойти дождь.
2. Вы можете показать мне дорогу в порт?
3. Я не смог прийти, так как был занят.
4. Мы должны завтра идти в порт? – Нет, не нужно.

ВАРИАНТ 3

Перепишите и письменно переведите текст на русский язык.

ENGINE ROOM DEPARTMENT

The man in charge of a vessel is the Master. He is responsible for the vessel, her cargo, and safety of all crew. He is an experienced and well-qualified navigator. His correct name is Master but often it is Captain. The ship's crew consists of Deck, Engine, and Catering departments. Each department has officers and ratings. The most experienced officer is in charge of a department.

Engine department operates, maintains, and repairs internal combustion engines, boilers, steam turbines, refrigeration and air conditioning systems, and also takes part in emergency repairs.

THE CHIEF ENGINEER is in command of the engine department and personnel. He is responsible for all ship's machinery, equipment, and control systems; for their operation, maintenance, and repair. The Chief Engineer is also responsible for administration, supervision, and economical operation of the engine department. He is responsible for engine department correspondence, records, and reports. He keeps the engine department files, manuals, and instructions for machinery and equipment.

THE SECOND ENGINEER OFFICER is the officer next in rank to the Chief Engineer. He is responsible for daily activities of the engine-room personnel. He supervises maintenance and repair works. He is also a watchkeeping Engineer who keeps two 4-hour watches. His duties include responsibility for the main engine, fire main system, water ballast system, bilge drainage system and refrigeration system.

THE THIRD ENGINEER OFFICER'S duties include responsibility for auxiliary engines, fuel storage and transfer system, air compressors, and air conditioner. The Third Engineer is usually in charge of bunkering operation.

THE FOURTH ENGINEER OFFICER usually has auxiliary boilers and waste-heat boilers in his responsibility. He is also in charge of sea-water sanitary system, galley and laundry mechanical equipment, and some other items.

THE ELECTRICAL ENGINEER is responsible for electrical propulsion plant, main and emergency switchboards, transformers and converters, fire pumps and other fire-fighting equipment, alarm systems, fire detection equipment and telephone systems, fans and electric heaters, deck equipment which is driven by electric motors, wiring, batteries of auxiliary and emergency generators, etc. He is also in charge of all lighting onboard including emergency, masts, and bridge lights. The Electrical Engineer is responsible for all technical documents and spare parts concerning all electrical equipment onboard.

1. Найдите и подчеркните в предложениях подлежащее и сказуемое. Определите время сказуемого.

1. Some of the sailors were busy with unloading, others were preparing for the departure.
2. One can see hundreds of ships enter and leave the British ports every day.
3. The space between the holds and the bottom of the hull contains double bottom tanks.
4. If the Captain orders we will change the course.

2. Составьте предложения. Помните о порядке слов.

1. Britain/to/bring/products/food/the ships.
2. The rank/call/to/according/we/officers.
3. The Nautical school/decided/I/and/work/to enter/at sea.
4. In time/finish/can't/the work/they.

3. Поставьте прилагательные в скобках в нужную форму.

1. The Baikal is (deep) lake in the world.
2. Who's (intelligent) person in your family?
3. Nick arrived (late) than John.
4. South of England is (warm) than north.

4. Напишите следующие предложения в Past Simple и Future Simple, изменив обстоятельства времени.

1. My friend keeps watch every day.
2. The ship often puts to sea.

5. Поставьте следующие предложения в вопросительную и отрицательную форму.

1. There is much oil in the tank.
2. We sometimes decrease the ship's speed.
3. He was good at navigation.
4. Their cargo ship left the port 2 days ago.

6. Задайте 4 типа вопросов и вопрос к подлежащему.

We learnt how to use life-saving appliances during our training.

7. Переведите на английский язык, употребляя модальные глаголы (may, can, must).

1. Они могут заказать билеты по телефону.
2. Вы можете немного подождать?
3. Мы должны взять на борт лоцмана.
4. Когда судно заходит в порт, нам можно сойти на берег.

КОНТРОЛЬНАЯ РАБОТА № 2

ВАРИАНТ 1

Перепишите и письменно переведите текст на русский язык.

KALININGRAD STATE MARINE PORT

Historically the Kaliningrad State Marine Port serviced the Russian fishing fleets of the Baltic, North Sea and North Atlantic.

The fleet consisted of a variety of fishing vessels which included factory-ships, fishing trawlers and seiners, auxiliary ships. The port also serviced a large transport fleet which catered for Russia's imports and exports.

In recent times many things have been changed which in turn have changed the function of the port of Kaliningrad. Fishing stocks have fallen due to overfishing in the North Atlantic and North Sea. This has caused the fishing industry to decline which in turn caused a decline in the fishing services at Kaliningrad port. This situation was complicated by the recession caused by the collapse of the former USSR which has continued in the current Russian Federation. The managers of the Kaliningrad State Marine Port were compelled to draw up plans for the revitalization of the port. They succeeded in maintaining large volumes of port activity which kept jobs in place. Kaliningrad Port is in a unique location in the centre of Europe and is Russia's most important ice-free port in the Baltic.

The original port of Kaliningrad was the old port of Königsberg which had only one quay of 90 metres. Now it is a major international port. Until 1952 port operations were carried out only during the fishing season. The total average tonnage was nearly 41.000 tonnes. Up to that time mechanization at the port was basic and transshipments were off-loaded to trucks for road transport to various inland destinations.

Owing to the huge fishing operations in the high seas of the Atlantic Ocean and the increase of the tonnage of ships using the port, the port authorities had to construct deep water wharves and quays. The increased port activities demanded many new facilities like cold storage, warehouses, workshops, a railway depot, a power station, a radio-centre and administrative offices. In 1970 the port area was extended to 120 hectares to accommodate the modern facilities at the port.

Nowadays the port has become a very busy place, carrying out a huge variety of port activities like loading and unloading operations, the transport and storage of fuel oils, the provision of clean water, the management and transportation of ammonia, the provision of navigational and fish-finding aids, a diving survey service of ship's hulls, the checking and correction of navigational charts and the provision and maintenance of security and rescue services at sea.

1. Ответьте на вопросы.

1. What fishing fleets did the Kaliningrad State Marine Port service?
2. What fishing vessels did the fleet consist of?
3. What was complicated situation of the port of 1990s caused by?
4. What was done for the port revitalization?
5. What is a location of Kaliningrad port?
6. Is the Kaliningrad State Marine Port ice-free?
7. How many quays did the old port of Königsberg have?
8. What were the reasons of deep water wharves construction in the port?
9. What did the increased port activities of 1970s demand?
10. What main modern port activities are carried out nowadays?

2. Переведите слова и словосочетания на русский язык.

Variety, auxiliary ships, fishing stocks, decline, compel, revitalization, maintain, quay, average, high seas, facilities, cold storage, warehouses, workshops, railway depot, extend, destination, unloading, survey, hull, rescue service.

3. Запишите предложения, заполнив пропуски.

1. The port ... a large transport fleet which catered for imports and exports.
2. Last year fishing stocks fell due to ... in the North Sea.
3. The port authorities constructed deep water ... and quays.
4. The port carried out a huge variety of port activities like
5. The port ... transport, storage of fuel oils and navigational aids.

4. Составьте предложения. Помните о порядке слов. Запишите получившиеся предложения.

1. clean/ for/ loading/ the ship's hold/ is/ and/ ready
2. forklift trucks/ stevedores/ use/ the pallets/ from/ the quay/ to/ a warehouse/ to remove/
3. than/ our/ cargo/ is/ dangerous/ more/ usual
4. crane/ for/ lifting/ is/ lowering/ the equipment/ and/ heavy things
5. mariners/ cargo handling/ are/ sometimes/ operations/ involved in

5. Переведите предложения с русского на английский язык.

1. Порт обслуживает рыболовный и транспортный флот России.
2. Порт находится в уникальном месте в центре Европы и является самым важным в России незамерзающим портом на Балтике.
3. Власти порта построили глубоководные причалы и разработали план по возрождению работы порта.
4. Расширение деятельности порта потребовало много новых объектов, складов, мастерских, нового грузового оборудования.
5. Наш порт выполняет большое количество портовых операций, таких как погрузка и разгрузка, транспортировка и хранение.

ВАРИАНТ 2

WELCOME TO A MODERN PORT

Today a major port is a world of its own. Modern port facilities have to meet the demands of highly specialised transport systems by sea, land and air. And so we find an amazing range of services. A modern port maintains shipping channels, harbour basins, and navigation aids as well as the port infrastructure such as wharves, quays, docks, storage areas and warehouses, cranes for cargo handling and terminals for cargoes. It provides pilots and pilot vessels, tugs for towage and emergency response vessels in cases of accidents at sea.

Within its area we find office buildings for all the various companies catering for the shipping industry – Ship Brokers, Shipping Agents, Stevedoring and Lashing Companies, Ship's Chandlers, Marine Engineering Companies, Companies for Marine Equipment and Ship's Repair, Cargo Surveyors and Inspection Companies, to name only a few. Today there are also strict security requirements.

The Port of Santander is situated in the region of Cantabria, Spain. A very good road network connects Santander to the whole of Spain, Portugal and the South of France. The port activity in Santander dates back more than 2000 years, the town being founded by the Romans in 19 BC.

Today the Port of Santander is a fast-growing port and an important junction in Spain for combined water, road and railway transport. In 2003 the total port traffic comprised about five million tons of goods. The Port of Santander has facilities for handling all types of cargo: dry and liquid bulk, general cargo, RORO and container traffic. The passenger terminal in the heart of the city has facilities for both ferries and cruise ships and there is regular ferry liner traffic to the United Kingdom.

Four million tonnes of dry bulk such as coal, ore, fertilisers, grain, soya beans, cereals and sodium carbonate passed through Santander in 2003. More than 1 million tons of general cargo was handled, RORO traffic accounted for 65% of this type of cargo.

Depending on the type, bulk goods can be loaded and unloaded using a conveyor, grabber or bucket. The bulk is loaded into a hopper, which passes it onto a conveyor belt system to deliver it to a stockpile.

Some bulk cargo such as scrap metal is loaded into big metal bins known as skips and lifted into the hold of the bulk carrier.

During the last few years vehicle handling shows the greatest increase in Santander: 36% in 2003. This is important for the port's image, as shipment of motor vehicles requires excellent standards of logistics operators, as well as port facilities and shipping lines.

The port has invested in and is continually making new investments in specialised handling installations for all the types of cargo already mentioned.

1. Ответьте на вопросы.

1. What does a modern port maintain?
2. What does a modern port provide in cases of accidents at sea?
3. What companies can we find within the port area?
4. Where is the Port of Santander situated?
5. What regions does the Port of Santander connect?
6. When was the Port of Santander founded?
7. What was the total port traffic in 2003?
8. What types of cargo pass through Santander?
9. What equipment is used to handle the cargo?
10. What cargo shows the greatest increase during the last few years in Santander?

2. Переведите слова и словосочетания на русский язык.

Port facilities, demands, boundaries, wharves, quays, warehouses, pilot, towage, junction, comprise, liquid bulk, ferry, coal, ore, fertilizers, RORO, molasses, bucket, conveyor belt system, stockpile, vehicle, increase, continually, handling.

3. Запишите предложения, заполнив пропуски.

1. Santander is an old port town; it was ... by the Romans.
2. In Santander water, road and railway transport meet; it is important ...
3. Traffic included or ... five million tons of goods in 2003.
4. Passenger ferries and cruise ships berth at a ...
5. The Port authorities have had to set up or ... specialized equipment for vehicle handling.

4. Составьте предложения. Помните о порядке слов. Запишите полученные предложения.

1. companies/ Ship Brokers/ and/that/ buy/ sell/ ships/ are
2. Ship's Chandlers/ procure/ and/ other/ food/ articles/equipment/ needed
3. in/ship owners/ represent/ ports/ Shipping Agents
4. provide/ Stevedoring Companies/ for/ loading/ personnel
5. service/ Shipping Companies/ offer/ shipment/ for

5. Переведите предложения с русского на английский язык.

1. Порт предоставляет лоцмана и буксир в случае необходимости.
2. Порт должен отвечать строгим требованиям безопасности.
3. В зависимости от типа сыпучие грузы можно загружать и выгружать с помощью конвейера, грейфера или ковша.
4. Порт имеет возможности для обработки всех видов грузов: навалочные и наливные грузы, генеральные грузы, RORO и контейнерные перевозки.
5. Наш порт является важным транспортным узлом.

ВАРИАНТ 3

Препишете и преведете текста

WEATHER CONDITIONS AT SEA

Weather conditions at sea depend on the time of the year and the area of sailing. Storms, rains, squalls, snow and sleet are frequent in the North Sea even in spring and summer. Dirty weather is no surprise in the Baltic in winter and autumn. Contrary to these ships very seldom run into dirty weather in southern seas. For instance, the navigation in the Marmara Sea presents few difficulties as the weather is generally fine.

Poor visibility and thick fog can affect the ship's speed. In such cases ships must slow down the speed to avoid possible collision with each other. Every vessel shall use sound signals too. In fog, mist, falling snow or heavy rain-storms, whether by day or night, a vessel underway shall sound a prolonged blast at intervals of not more than two minutes.

Modern achievements of science and engineering help the scientists solve the problem of short-time forecasting. Satellites, research ships and a net of coast weather stations send necessary data to the Meteo Centre. A lot of people are involved in this work taking a great deal of readings. Sailors obtain better weather information than any other people. Before each voyage they receive a complete briefing of the weather expected. Weather reporting system also gives information on changing meteo conditions route and at the ship's destination.

To prevent ships from running into heavy storms coast radio meteo-stations broadcast weather bulletins four times a day according to a definite schedule. Weather reports contain the information about the force and direction of the wind, visibility and pressure. Northeasterly winds and gales generally mean dirty weather. Marine forecasts also give warnings of typhoons and cyclones.

Cyclones or, as sailors call them, hurricanes can be several hundred kilometres wide. They appear in the Atlantic Ocean and carry a trail of violence across the Caribbean Sea or up the East coast of America. Typhoons - the name of hurricanes in the Pacific Ocean, spread disaster over the eastern shores of Asia. In the open sea ships can usually ride these storms. But in port, surprisingly as it might seem, they are in great danger as the surge and the terrific wind can carry them from their moorings on to beaches or rocks.

A whirlwind is a most dreadful thing. A tornado is even more violent than a whirlwind. But fortunately, not all winds are of such force. There are also trade winds blowing in one direction almost all the year round. These favourable north-east winds prevail at the Canary Islands.

1. Ответьте на вопросы.

1. What do weather conditions depend on at sea?
2. What are frequent precipitations in the North Sea all the year round?
3. Does the navigation present few difficulties in the Marmara Sea?
4. What weather conditions can affect the ship's speed?
5. What signals shall every vessel use in fog?
6. What helps the scientists to solve the problem of short-time forecasting?
7. What information does weather reporting system give?
8. How many times a day do coast radio meteo-stations broadcast?
9. What information and warnings do weather reports usually contain?
10. What ocean do hurricanes appear?

2. Переведите слова и словосочетания на русский язык.

Depend on, squalls, sleet, poor visibility, fog, collision, mist, underway, forecasting, obtain, destination, broadcast, schedule, contain, pressure, gale, warning, cyclone, disaster, mooring, whirlwind, blow, direction, force, prevail.

3. Запишите предложения, заполнив пропуски.

1. Before each ... ships receive a complete briefing of the weather expected.
2. A ... is even more violent than a whirlwind.
3. Fog, mist, falling snow or heavy rainstorms can ... the ship's speed.
4. The scientists solve the problem of short-time
5. Satellites, research ships and a net of coast weather stations send necessary data to the

4. Составьте предложения. Помните о порядке слов. Запишите полученные предложения.

1. collided with/ we/yesterday/ but/ there/ a tanker/ was/ no/ damage
2. expected/ gale force winds/ the north area/ are/ in
3. the rotation/ called/ a cyclone/ around/ a low pressure area/ is
4. will/ I/ repeat/ tomorrow/ the forecast
5. tornado/ the rain/ and/ strong/ will/ heavy/ bring/ winds

5. Переведите предложения с русского на английский язык.

1. Погода на море зависит от времени года и района плавания.
2. Плохая видимость и густой туман могут повлиять на безопасность судна.
3. Судно должно замедлить скорость и издать протяжный сигнал, чтобы избежать столкновения.
4. Сводки погоды содержат информацию о силе и направлении ветра, видимости и давлении.
5. Во время шторма судно находится в большей опасности в порту, чем в открытом море.

ВАРИАНТ 1

Перепишите и письменно переведите текст на русский язык.

PARTS OF A SHIP

To understand parts of a ship, one must have to go through some common terms. There are some main parts which are common to all types of ships. A ship has three main parts which are: a hull, an engine room and a navigation bridge.

The most forward part of a ship is called a bow; the left-hand side of the ship is referred to as port whereas the right side is called starboard. Likewise, the front side is termed as forward and back side as astern.

A bow is the front most part of a ship which cuts the water along its sides as the ship proceeds. The stern is aft end structure and designed to provide low resistance, high propulsion efficiency and avoid vibrations. It is the rearmost part of a ship which keeps the water out. Rudders and propellers are hung to the stern.

The hull is a watertight body of a vessel which may be open or may be partially covered with a deck. Hull has several watertight decks and bulkheads as the major transverse membrane. The intermediate member of the hull consists of girders, webs and stringers. Ship hull structure is covered by the deck floor. The deck at the top which bears maximum exposure to weather is referred to as the main deck or weather deck. The boat deck's main function is holding the hull structure and providing floor to work and standing and guard them against outside weather.

Monkey Island is a sort of deck located at a topmost accessible height of the ship and just above the bridge. This part of a ship is sometimes also referred to as a flying bridge and, in past, was used by the sailors for solar and stellar observations. It houses a magnetic compass.

The ship's bridge is the commanding station of a ship. It controls the ship movement through its navigational equipment. It controls important deck machinery, main engine and ship's navigation system.

The forecastle is one of the foremost parts of the ship. It serves many functions such as holding, anchoring and securing the major parts of the ship.

An engine room is the power house of the ship located in the lowest most deck on aft of the ship. It is the most important part of the ship without which a ship can't move. It contains important machinery such as main engine, auxiliary engine, shafting, boiler, fresh water generator, air compressor, purifier, incinerator, pumps, heat exchangers, workshop machineries etc. A propeller is a mechanical device having blades fitted on a central shaft. These blades rotate and their rotational energy is converted into pressure energy and due to this, the pro-

propeller produces thrust required for propulsion. Engine, shaft and propeller together constitute propulsion unit.

Poop deck serves as a roof to the cabin constructed in the aft of the ship. It facilitates the captain and helmsman to supervise the entire working crew. But in modern ships, the poop decks are provided either in the centre of the ship or on the starboard.

The compartments maintained specially to carry water, which serves the purpose of ballasting and stabilizing the vessel, are termed as ballast tanks. An anchor is a heavy item that is dropped down into the water, touching the bottom of the body of water and securing the vessel.

The accommodation area is the house for crews. It has all the amenities along with offices, gym, crew cabins, hospital, salon, recreation room, common rooms, laundry and galley.

1. Ответьте на вопросы.

1. What are the three main parts of a ship?
2. What terms indicate the left-hand side and the right-hand side of any ship?
3. What is the name of the front most part of a ship?
4. What is the hull covered by?
5. What is the ship's bridge designed for?
6. What equipment can be found in the engine room?
7. Where are poop decks usually situated?
8. What is a propeller?
9. How is a heavy item that is dropped down into the water, touching the bottom of the body of water and securing the vessel called?
10. What is there in the accommodation area?

2. Переведите слова и словосочетания на русский язык.

A mechanical device, a fresh water generator, a crew cabin, a helmsman, an engine room, a poop, heat exchangers, a hull, anchoring, a navigation bridge, aft end structures, a watertight body of a vessel, an upper deck, required for propulsion, a galley, an air compressor, to supervise, a pump, main engine, auxiliary engine.

3. Закончите предложения, выбрав одно из данных слов/словосочетаний. Запишите получившиеся предложения.

Monkey island, ships, bow, ship's bridge, hull, anchor, stern.

1. There are some main parts which are common to all types of...
2. The most forward part of a ship is called a...
3. The ... is a watertight body of a vessel which may be open or may be partially covered with a deck.

4. Rudders and propellers are hung to the ...
5. ... is a sort of deck located at a topmost accessible height of the ship and just above the bridge.
6. The ... is the commanding station of a ship.
7. An is a heavy item that is dropped down into the water, touching the bottom of the body of water and securing the vessel.

4. Составьте предложения. Помните о порядке слов. Запишите получившиеся предложения.

1. a /three/ parts/ main/ ship/ has.
2. watertight /has/ several/ and/ bulkheads/ hull/ decks.
3. as/ poop/ a/ to/ the/ cabin/ deck/ serves/ roof.
4. item/ an/ anchor/ a/ heavy/ is.
5. of/ power/ an/ room/ is/ the/ the/ ship/ engine/ house.

5. Задайте вопросы к выделенным словам и словосочетаниям.

1. A ship has **three** main parts.
2. The intermediate member of the hull consists of **girders, webs and stringers**.
3. **The ship's bridge** controls the ship movement through its navigational equipment.
4. This part of a ship is sometimes also referred to as **a flying bridge**.
5. Poop decks are provided either **in the centre of the ship or on the starboard**.

6. Переведите предложения с русского на английский язык.

1. Самая передняя часть корабля называется «нос».
2. Винты подвешены к корме.
3. Навигационный мостик – это командная станция корабля.
4. Палубы судна покрыты палубным настилом.
5. В машинном отделении есть такие важные механизмы, как главный двигатель, вспомогательный двигатель, вал, котел, генератор пресной воды, воздушный компрессор, очиститель, мусоросжигатель, насосы, теплообменники, мастерские.
6. Двигатель, вал и винт вместе составляют силовую установку.

ВАРИАНТ 2

Перепишите и письменно переведите текст на русский язык.

TYPES OF VESSELS

Ships are defined as large complex vessels capable of sailing across the oceans and are of more than 500 tonnage. They are large, robust and strong vessels which carry large goods, perform war efforts, carry people and transport raw materials. Different types of ships in commercial shipping or merchant navy are classified on the basis of their size, cargo, function and construction.

We can classify all ships according to the purpose they serve.

The purposes are as follows: transportation (of cargo, passengers), assistance and service, catching of fish, keeping peace. Ships that transport cargo or passengers can be liners or tramps. Merchant ships can carry general cargoes, bulk cargoes, refrigerated cargoes, heavy cargoes, timber, etc.

General cargo ships transport packed cargo (in crates, boxes, bags). This cargo is loaded/unloaded by the vessel's own derricks or by shore based cranes. Nowadays this type of vessel is being ousted by container carriers.

Container ships transport different kinds of cargo in containers which are arranged in rows, bays, tiers on the ship. Container carriers are sometimes equipped with gantry cranes to handle the cargo. There are some advantages of carrying cargo in containers.

Bulk carriers transport unpacked cargo of one commodity. There can be dry bulk cargo and liquid cargo which is transported by dry bulk carriers and tankers respectively. Dry bulk cargo is handled by cranes with grabs or by pumps. Tankers are often loaded and discharged in the offing by flexible pipes. There are some advantages of this method of handling wet bulk cargo.

Ro/Ro ships carry loaded vehicles. No cargo handling equipment is required.

Reefers transport perishable cargoes. They are equipped with refrigerating plants.

Lash-vessels have a flat deck without obstacles. A lighter is hoisted on board by the vessel's heavy derrick, or it can be loaded/discharged by a docking method. This type of vessel can be called a 'Seabee'.

Timber carriers have tall derricks. They are designed to transport a tall deck cargo. The Plimsoll Mark has a special timber Load-line which indicates the maximum draft to which the ship is allowed to be loaded under certain circumstances and in different seasons.

Heavy-load vessels transport very heavy cargo on deck. Very heavy derricks, masts and lifting blocks are used to load/discharge drilling platforms, engines, etc. There is another method of loading when the cargo module floats

over the submerged ship. Heavy-load vessels are equipped with a powerful pumping system.

Multi-purpose vessels carry general cargo, bulk cargo and containerized cargo. Different cargo handling gears load and discharge different types of cargoes.

Passenger ships carry passengers and their vehicles on a prearranged route.

Coasters carry cargo along the coast or on Trans-Atlantic voyages. They have broad hatches and no tweendecks. To avoid transverse stresses transverse strengthenings are required.

Assistance and service are provided by such vessels as tugs, salvage vessels, buoyage vessels, survey vessels, supply boats, SAR-vessels, fire boats, pilot tenders, cable-layers, dredgers, icebreakers and lightships.

Fishermen (large and modern fishing vessels) catch and process fish. Large refrigerating plants onboard provide deep freezing facilities. They are also equipped with powerful winches which are used for hoisting the nets on board.

Warships keep peace, can develop speeds of 25 knots and are equipped with a high-power propulsion plant.

1. Ответьте на вопросы.

1. What is the definition of a ship?
2. How are commercial ships classified?
3. What cargo can merchant ships carry?
4. What do general cargo ships transport?
5. What do container ships carry?
6. What do bulk carriers transport?
7. What are reefers equipped with?
8. What equipment can be found on board heavy-load vessels?
9. What kinds of ships provide assistance and service?
10. What kind of equipment is there on board fishing vessels?

2. Переведите слова и словосочетания на русский язык.

To handle the cargo, deck cargo, a refrigerating plant, to develop speed, a heavy-load vessel, to provide assistance and service, a tug, a salvage vessel, a buoyage vessel, a survey vessel, a supply boat, a vehicle, a powerful winch, maximum draft, to hoist the nets on board, a powerful pumping system, to carry goods.

3. Закончите предложения, выбрав одно из данных слов/ словосочетаний. Запишите получившиеся предложения.

Purpose, service, containers, passengers, tramps, ships, perishable cargoes.

1. ... are defined as large complex vessels capable of sailing across the oceans.

2. We can classify all ships according to the ... they serve.
3. Ships that transport cargo or passengers can be liners or....
4. Container ships transport different kinds of cargo in....
5. Reefers transport....
6. Passenger ships carry and their vehicles on a prearranged route.
7. Assistance and are provided by such vessels as tugs, salvage vessels, buoyage vessels etc.

4. Составьте предложения. Помните о порядке слов. Запишите получившиеся предложения.

6. large/ and/ vessels/ they/ robust/ strong/ are.
7. passengers/ ships/ transport/ cargo/ or/ can.
8. advantages/ there/ are/ some cargo/ in/ carrying/ containers/ of.
9. method/ there is/ loading/ another/ of.
10. equipped/ warships/ are/ a high-power propulsion plant/ with.

5. Задайте вопросы к выделенным словам и словосочетаниям.

1. We can classify all ships according to the **purpose** they serve.
2. This cargo is loaded/unloaded by **the vessel's own derricks or by shore based cranes**.
3. Ro/Ro ships carry **loaded vehicles**.
4. **Heavy-load vessels** are equipped with a powerful pumping system.
5. To avoid transverse stresses **transverse strengthenings** are required.

6. Переведите предложения с русского на английский язык.

1. Различные типы судов можно классифицировать на основании их размера, перевозимого груза и функции.
2. Контейнеровозы перевозят различные типы груза в контейнерах.
3. Не требуется погрузочно-разгрузочное оборудование.
4. Рефрижераторы перевозят скоропортящиеся грузы.
5. Разные погрузочно-разгрузочные механизмы загружают и выгружают разнообразные виды грузов.
6. Большие холодильные установки на борту обеспечивают возможность глубокой заморозки.

ВАРИАНТ 3

Перепишите и письменно переведите текст на русский язык.

ASSISTANCE AND SERVICE VESSELS

Vessels that render assistance and service have been designed to perform specific tasks, for example, assisting other vessels, or providing special services to navigation.

A *tug* is a vessel that assists other vessels with entering or leaving the port, tows an oil rig to its position or assists with a salvage operation. There are sea-going tugs and harbor tugs. Their engines must be capable to develop enormous powers. The largest and most powerful tugs are often fitted with controllable pitch propellers (C.P.P) that have adjustable blades, bow thrusters and stern thrusters.

A *salvage vessel* is a vessel that rescues other ships and their cargoes from loss at sea. She must be equipped with heavy derricks to lift wrecks from the seabed.

A *buoyage vessel* places and maintains buoys. Her aft deck is flat and provides room to carry or haul in the buoys with her hoisting installation.

A *survey vessel* performs marine research. She is equipped with oceanographic instruments to carry out all kinds of measurements and assessments.

A *supply boat* supplies oil rigs with stores, spare parts and supplies for domestic use. Her aft deck must be flat. Additional duties may include the towing of rigs and extinguishing fires, for which they must be equipped with high-capacity fire-extinguishing pumps.

A *SAR-vessel* performs search and rescue when a ship is in distress. She must be capable to develop high speeds and must be equipped with the most modern communication equipment to maintain contact with Rescue Coordination Centres (RCC).

A *firefloat* is a fire fighting vessel. She must have a powerful fire-extinguishing system on board.

A *pilot tender* (pilot launch) is a small boat that may be launched from the pilot boat. The pilot will embark the ship that has requested pilotage from the pilot tender. She is often fitted with a sheltered aft deck to prevent the pilot from getting wet.

A *cable layer* lays cables on the bottom of the sea. She is fitted with a huge horizontal wheel that reels off the cable. This type of ship is often equipped with a Dynamic Positioning System to keep her in the exact position when the submarine cable is reeled off.

A *light ship* serves as a beacon to navigation and is anchored in the vicinity of crowded channels or seaways. She is usually not self-propelled, which means that she has to be towed to her position.

Icebreakers are designed to ride up the ice and crash a way through for other ships to follow. This requires a powerful engine and a considerable strengthening of her stern.

A dredger deepens out harbours and ports, fairways approaches and entrances, inland waterways, anchorages, roadsteads, etc. Spoil is discharged into a hopper that is moored alongside. To keep her in position she is often spudded. There are bucket dredgers, grab dredgers (backhoe dredgers) and suction dredgers with drag heads. A cutterhead is used to disintegrate rocky bottoms.

1. Ответьте на вопросы.

1. What is a tug?
2. What kinds of tugs are there?
3. What are the largest and most powerful tugs often fitted with?
4. What does C.P.P. mean?
5. How a salvage vessel can be defined?
6. What is a buoyage vessel designed for?
7. What kind of vessel performs marine research?
8. What is the main function of a cable layer?
9. What is a light ship designed for?
10. What is used to disintegrate rocky bottoms?

2. Переведите слова и словосочетания на русский язык.

An anchorage, to carry out, a buoyage vessel, a salvage vessel, an icebreaker, a powerful tug, a rocky bottom, a roadstead, a powerful engine, to moor, a harbour, oceanographic instruments, a beacon to navigation, pilotage, a hoisting installation, a heavy derrick, a controllable pitch propeller, a submarine cable, a blade.

3. Закончите предложения, выбрав одно из данных слов/ словосочетаний. Запишите получившиеся предложения.

Survey, high, powers, service, cable, require, fire.

1. Vessels that render assistance and ... have been designed to perform specific tasks.
2. Their engines must be capable to develop enormous
3. A ... vessel is equipped with oceanographic instruments.
4. This vessel must be capable to develop ... speeds.
5. A firefloat is a ... fighting vessel.
6. A cable layer is fitted with a huge horizontal wheel that reels off the
7. Icebreakers ... powerful engines.

4. Составьте предложения. Помните о порядке слов. Запишите получившиеся предложения.

1. with/ she/ be equipped/ heavy derricks/ must.
2. Include/ additional duties/ the towing of rigs/ extinguishing fires/ may/ and.
3. a/ small/ launch/ pilot/ is/ a boat.
4. has to/ she/ be towed/ her position/ to.
5. are/ icebreakers/ to crash a way/ for other ships/ through the ice.

5. Задайте вопросы к выделенным словам и словосочетаниям.

1. Their engines must be capable to **develop enormous powers**.
2. A salvage vessel is a vessel that **rescues other ships and their cargoes from loss at sea**.
3. She is equipped with **oceanographic** instruments.
4. **A firefloat** is a fire fighting vessel.
5. A dredger deepens out **harbours and ports, fairways approaches and entrances, inland waterways, anchorages, roadsteads, etc.**

6. Переведите предложения с русского на английский язык.

1. Существуют морские буксиры и портовые буксиры.
2. Крупнейшие и самые мощные буксиры часто оснащены винтами с регулируемым шагом.
3. Судно должно развивать высокие скорости и должно быть оснащено самым современным оборудованием связи.
4. Кабелепрокладочное судно прокладывает кабели на дне моря.
5. Этому судну необходим мощный двигатель и значительное усиление кормы.
6. Дноуглубительное судно углубляет гавани и порты, внутренние водные пути, якорные стоянки, рейды и т. д.

КОНТРОЛЬНАЯ РАБОТА № 4

ВАРИАНТ 1

Перепишите и письменно переведите текст на русский язык.

SAFETY ABOARD

Accidents are usually the result of carelessness, mistakes, lack of care, and often result in injury. Consideration will now be given to avoiding accidents by the adoption of safe working practices.

Working clothes should be chosen with the job and hazards in mind. They should fit fairly closely with no loose flaps, straps or ragged pockets. Clothing should cover as much of the body as possible and a stout pair of shoes worn. Neck chains, finger rings and wristwatches should not be worn, particularly in the vicinity of rotating machinery. Where particular hazards are present appropriate protection, such as goggles or ear muffs should be worn.

When overhauling machinery or equipment, it must be effectively isolated from all sources of power. This may involve unplugging from an electrical circuit, the removal of fuses or the securing open of circuit breakers. Suction and discharge valves or pumps should be securely closed and the pump casing relieved of pressure. Special care should be taken with steam operated or steam-using equipment to ensure no pressure built-up can occur.

When lifting equipment during overhaul, screw-in bolts should be used where possible. These should be fully entered up to the collar and the threads on the eyebolt and in the equipment should be in good condition. Any lifting wires used should be in good condition without broken strands or sharp edges.

Before any work is done on the main engine, the turning gear should be engaged and a warning posted at the control position. Lubricating oil in the working area should be cleaned up and where necessary suitable staging erected. The turning gear should be made inoperative if not required during the overhaul. Where it is used, care must be taken to ensure all personnel are clear before it is used.

Where overhead work is necessary suitable staging should be provided and adequately lashed down. Staging planks should be examined before use and where suspected discarded. Where ladders are used for access they must be secured at either end. Personnel working on staging should take care with tools and store them in a container.

Boiler blowbacks can cause serious injury and yet with care can usually be avoided. The furnace floor should be free of oil and burners regularly checked to ensure that they do not drip, particularly when not in use. The manufacturer's instructions should be followed with regarding to lighting up procedures.

Generally, this will involve blowing through the furnace (purging) with air prior to lighting up. The fuel oil must be at the correct temperature and lit with a torch. If ignition does not immediately occur the oil should be turned off and purging repeated before a second attempt is made. The burner should be withdrawn and examined before it is lit.

Entry into enclosed spaces should only take place under certain specific conditions. An enclosed space, such as a duct keel, a double bottom tank, a cofferdam, boiler, etc. cannot be assumed to contain oxygen. Anyone required to enter such a space should only do so with the permission of a responsible officer. The space should be well ventilated before entry takes place and breathing apparatus taken along: it should be used if any discomfort or drowsiness is felt. Another person should remain at the entrance to summon assistance if necessary and there should be a means of communication arranged between the person within the space and the attendant. Lifelines and harness should be available at the entrance to the space. The attendant should first raise the alarm where the occupant appears in danger but should not enter the space unless equipped with breathing apparatus.

Training in the use of safety equipment and the conduct of rescues is essential for all personnel involved.

1. Ответьте на вопросы.

1. Why do accidents occur?
2. What are the requirements to working clothes?
3. When is it necessary to wear goggles or ear muffs?
4. What should be done first before overhauling machinery or equipment?
5. What are the requirements to lifting wires?
6. What should be done before any work on the main engine?
7. Where should all tools be stored?
8. What are the general requirements to the furnace floor and burners?
9. What are the general rules for entering into enclosed spaces?
10. Who should raise the alarm first in case of emergency in enclosed spaces?

2. Переведите слова и словосочетания на русский язык.

Main engine, ear muffs, a double bottom tank, furnace floor, goggles, a burner, equipment, to overhaul machinery, a duct keel, to raise the alarm, a cofferdam, tools, a boiler, well ventilated, steam operated equipment, a warning, carelessness, an accident, a means of communication.

3. Закончите предложения, выбрав одно из данных слов/ словосочетаний. Запишите получившиеся предложения.

Clothes, personnel, oil, closed, accidents, good condition, use.

1. ... are usually the result of carelessness, mistakes, lack of care, and often result in injury.

2. Working ... should be chosen with the job and hazards in mind.
3. Suction and discharge valves or pumps should be securely ... and the pump casing relieved of pressure.
4. These should be fully entered up to the collar and the threads on the eye-bolt and in the equipment should be in
5. Lubricating ... in the working area should be cleaned up and where necessary suitable staging erected.
6. Staging planks should be examined before
7. Training in the use of safety equipment and the conduct of rescues is essential for all ... involved.

4. Составьте предложения. Помните о порядке слов. Запишите получившиеся предложения.

1. should/ consideration/ accidents/ given/ to avoid/ be.
2. clothing/ possible/ cover/ as much/ should/ of the body/ as.
3. worn/ or/ goggles/ should/ ear muffs/ be.
4. special care/ should/ with/ be taken/ steam-using equipment.
5. instructions/ followed/ the manufacturer's/ should be.

5. Задайте вопросы к выделенным словам и словосочетаниям.

1. **Working clothes** should be chosen with the job and hazards in mind.
2. When lifting equipment during overhaul, **screw-in bolts** should be used where possible.
3. Staging planks should be examined **before use** and where suspected discarded.
4. Another person should remain at the entrance **to summon assistance if necessary**.
5. Lifelines and harness should be available **at the entrance to the space**.

6. Переведите предложения с русского на английский язык.

1. Несчастные случаи, как правило, являются результатом небрежности, ошибок, недостатка внимания и часто приводят к травмам.
2. Одежда должна плотно прилегать, не иметь свободных клапанов, ремешков или рваных карманов.
3. При наличии особых опасностей следует надевать соответствующую защиту, такую как защитные очки или противошумные наушники.
4. При капитальном ремонте механизмов или оборудования, они должны быть эффективно изолированы от всех источников энергии.
5. Перед входом в помещение его следует хорошо проветрить и взять с собой дыхательный аппарат.
6. Обучение использованию средств обеспечения безопасности и проведению спасательных работ крайне важно для всего персонала.

ВАРИАНТ 2

Перепишите и письменно переведите текст на русский язык.

TYPES OF MARINE ENGINES

The diesel engine is a form of internal combustion engine. Its power is expressed as brake horse power (bhp). This is the power put out by the engine. Effective horsepower is the power developed by the piston in the cylinder, but some of this is lost by friction within the engine. The power output of a modern marine diesel engine is about 40,000 brake horsepower.

Large diesel engines, which have cylinders nearly 3 ft. in diameter, turn at the relatively slow speed of about 108 rpm. These are known as slow-speed diesel engines. They can be connected directly to the propeller without gearing. These large slowly running engines are used in the larger merchant ships, particularly in tankers and bulk carriers. The main reason is their low fuel consumption. The low-speed engine is characterized by rated speeds in the large range of 80-120 revolutions per minute. In all cases it is a two-stroke engine supercharged by exhaust-gas turbochargers. Whereas medium-speed engines are widely employed ashore, the low-speed engine is almost exclusively a marine engine that is designed to match efficient propeller speeds without recourse to a speed-reducing gear. Nevertheless, low speed and large individual cylinder displacement convey advantage to the low-speed engines, since the features allow the lowest-quality- and hence cheapest fuel to be burned. Height, in particular, is a limiting feature of the low-speed engine. In some types of ship, the extra machinery space will interfere with cargo or passenger space.

More and more of the large merchant vessels are being powered by medium-speed diesel engines. They are connected to the propeller by gearing. This type of gearing was once restricted to smaller cargo ships, but now they are used in fast cargo liners as well as in tankers and bulk carriers. They are cheaper than slow-speed diesel engines, and their smaller size and weight can result in a smaller, cheaper ship. The medium-speed engine, characterized by rated speeds in the range of 400-600 revolutions per minute, is in practically all cases a four-stroke engine supercharged by exhaust-driven turbochargers.

Medium speed diesels, e.g. 250 to 750 rev/mm, and slow speed diesels, e.g. 100 to 120 rev/mm, each have their various advantages and disadvantages for various duties on board ship.

The slow speed two-stroke cycle diesel is used for main propulsion units since it can be directly coupled to the propeller and shafting. It provides high powers, can burn low grade fuels and has a high thermal efficiency. The cylinders and crankcase are isolated. The use of the two-stroke cycle usually means there are no inlet and exhaust valves.

Medium speed four-stroke engines provide a better power-to-weight ratio and power-to-size ratio and there is also a lower-initial cost of equivalent power. The higher speed however, requires the use of a gearbox and flexible couplings for main propulsion use. Cylinders are smaller, cylinder liners are of simple construction since there are no ports, but cylinder heads are more complicated and valve-operating gear is required. Better quality fuel is necessary because of the higher engine speed and lubricating oil consumption is higher than for a slow speed diesel. The Vee engine configuration is used with some medium speed engine designs to further reduce the size and weight for a particular power.

High-speed engines with rated speeds of 900 to 1,200 revolutions per minute are used in a few cases in ships, but engines of this class are almost always found in small craft such as tugs, fishing vessels and high-speed ferries.

1. Ответьте на вопросы.

1. What is engine`s power?
2. What is the definition of horsepower?
3. What engines are known as slow-speed diesel engines?
4. In what kinds of ships are slowly running engines used?
5. How many strokes do slowly running engines have?
6. What are the rated speeds of slow-speed diesel engines?
7. How are medium-speed diesel engines connected to the propeller?
8. What are the advantages of slow-speed diesel engines?
9. What are the advantages of medium-speed diesel engines?
10. What kinds of ships use high-speed engines?

2. Переведите слова и словосочетания на русский язык.

A slow-speed diesel engine, a medium-speed diesel engine, horsepower, ratio, fuel, a propeller, consumption, a lubricating oil, a cylinder liner, a high thermal efficiency, a turbocharger, a gearbox, a four-stroke engine, a two-stroke engine, a high-speed ferry, revolutions per minute, an internal combustion engine.

3. Закончите предложения, выбрав одно из данных слов/ словосочетаний. Запишите получившиеся предложения.

Horsepower, bulk carriers, speed, connected, revolutions per minute, diesel engine, experimental basis.

1. The ... is a form of internal combustion engine.
2. Effective ... is the power developed by the piston in the cylinder, but some of this is lost by friction within the engine.
3. They can be ... directly to the propeller without gearing.
4. These large slowly running engines are used in the larger merchant ships, particularly in tankers and
5. The low-speed engine is characterized by rated speeds in the large range of 80-120

6. Even finely powdered coal and coal-oil slurries have been burned in these engines on an
7. Medium ... four-stroke engines provide a better power-to-weight ratio and power-to-size ratio and there is also a lower-initial cost of equivalent power.

4. Составьте предложения. Помните о порядке слов. Запишите получившиеся предложения.

1. power/ its/ is/ as brake horse power/ expressed.
2. about/ of a modern marine diesel engine/ the power output/ is / 40,000 brake horsepower.
3. could/ higher power/ be produced/ revolutions/ higher/ by.
4. fuel consumption/ the main reason/ their low/ is.
5. used/ the Vee engine configuration/ is/ some medium speed engine/ with / designs.

5. Задайте вопросы к выделенным словам и словосочетаниям.

1. Its power is expressed as **brake horse power (bhp)**.
2. The power output of a modern marine diesel engine is **about 40,000 brake horsepower**.
3. They can be connected **directly to the propeller without gearing**.
4. **The slow speed two-stroke cycle diesel** is used for main propulsion units.
5. Engines of this class are almost always found **in small craft such as tugs, fishing vessels and high-speed ferries**.

6. Переведите предложения с русского на английский язык.

1. Большие дизельные двигатели с цилиндрами диаметром почти 3 фута работают на относительной медленной скорости около 108 об / мин.
2. Эти большие медленно работающие двигатели используются на крупных торговых судах, особенно на танкерах и сухогрузах.
3. На некоторых типах судов дополнительная зона размещения оборудования и механизмов будет мешать грузовому или пассажирскому пространству.
4. Выходная мощность пропорциональна произведению скорости и рабочего объема цилиндра, а размер и масса двигателя примерно пропорциональны рабочему объему цилиндра.
5. Использование двухтактного двигателя обычно означает отсутствие впускных и выпускных клапанов.
6. Топливо более высокого качества необходимо из-за более высокой частоты вращения двигателя, а расход смазочного масла выше, чем для двигателя с низкими скоростями вращения.

ВАРИАНТ 3

Перепишите и письменно переведите текст на русский язык.

THE WATCHKEEPING SYSTEM

The system of watches adopted on board ship is usually a four-hour period working with eight hours rest for the members of each watch. The three watches in any 12-hour period are usually 12-4, 4-8 and 8-12. The word "watch" is taken as meaning the time period and also the personnel at work during that period. The watchkeeping arrangements will be decided by the Chief Engineer. Factors to be taken into account in this matter will include the type of ship, the type of machinery and degree of automation, the qualification and experience of the members of the watch, any special conditions such as weather, ship location, international and local regulations, etc. The engineer officer in charge of the watch is the Chief Engineer's representative and is responsible for the safe and efficient operation and upkeep of all machinery affecting the safety of the ship.

OPERATING THE WATCH

An engineer officer in charge will form the watch. Each member of the watch should be familiar with his duties and safety and survival equipment in the machinery space. This would include knowledge of the firefighting equipment with respect to location and operation, being able to distinguish the different alarms and the action required, an understanding of communication systems and how to summon help. At the beginning of the watch the current operational parameters and the condition of all machinery should be verified and also the log readings should correspond to those observed. The engineer officer in charge should note if there are any special orders or instructions relating to the operation of main machinery or auxiliaries. The levels of tanks containing fuel, water, slops, ballast should be noted and also the level of the various bilges.

At appropriate intervals inspections should be made of the main propulsion plant, auxiliary machinery and steering gear spaces. Any routine adjustments may then be made and malfunctions or breakdowns can be noted, reported and corrected. During these tours of inspection bilge levels should be noted, piping and systems observed for leaks, and local indicating instruments should be observed. When under standby or maneuvering conditions with the machinery manually operated the control unit should be continuously manned.

Certain watchkeeping duties will be necessary for the continuous operation of equipment or plant - the transferring of fuel for instance. In addition to these regular tasks, other repair or maintenance tasks may be required of the watchkeeping personnel. However, no tasks should be set or undertaken which will interfere with the supervisory duties relating to the main machinery and associated equipment. During the watch a log or record will be taken of various

parameters of main and auxiliary equipment. The completed log is used to compile a summary sheet or abstract of information which is returned to the company head office for record purposes.

Where situations occur in the machinery space which may affect the speed, maneuverability power supply or other essentials for the safe operation of the ship, the bridge should be informed as soon as possible.

The engineer in charge should notify the Chief Engineer in the event of any serious occurrence or a situation where he is unsure of the action to take. However, where immediate action is necessary to ensure safety of the ship, its machinery and crew, it must be taken by the engineer in charge. At the completion of the watch each member should hand over to his relief, ensuring that he is competent to take over and carry out his duties effectively.

1. Ответьте на вопросы.

1. What does the word “watch” mean?
2. Who is responsible for the watchkeeping arrangements?
3. What is the engineer officer responsible for?
4. What should be verified at the beginning of the watch?
5. What should be done in case of malfunctions or breakdowns?
6. How is the machinery operated under standby or maneuvering conditions?
7. Where is the completed log returned to?
8. In what cases should the bridge be informed as soon as possible?
9. Who should the engineer in charge notify first in case of trouble?
10. What should each member do at the completion of the watch?

2. Переведите слова и словосочетания на русский язык.

Machinery, watchkeeping arrangements, maneuvering, a crew, on board ship, a severe damage, at the completion of the watch, to verify, to carry out, a manual operation, watchkeeping personnel, safety, machinery space, automatically, to take appropriate action, transferring of fuel, auxiliary equipment, a data logger.

3. Закончите предложения, выбрав одно из данных слов/ словосочетаний. Запишите получившиеся предложения.

Chief Engineer, machinery, inspections, machinery space, kept, watches, take appropriate action.

1. The system of ... adopted on board ship is usually a four-hour period working with eight hours rest for the members of each watch.
2. The watchkeeping arrangements will be decided by the....
3. Each member of the watch should be familiar with his duties and safety and survival equipment in the...
4. The engineer officer in charge should note if there are any special orders or instructions relating to the operation of main ... or auxiliaries.

5. At appropriate intervals ... should be made of the main propulsion plant, auxiliary machinery and steering gear spaces.
6. Bilge orders must be promptly carried out and a record of any required changes in speed and direction should be
7. This notification should preferably be given before any changes are made to enable the bridge to

4. Составьте предложения. Помните о порядке слов. Запишите получившиеся предложения.

1. An engineer officer/ the watch/ will form /in charge with /and one or more ratings/ a junior engineer assisting.
2. The engineer officer in charge/ special orders or instructions/ any /should note/ if there are.
3. And/ should /the operating mode of equipment/ available standby equipment /also be noted.
4. Must/ bilge orders/ carried out /be promptly.
5. Should/ the Chief Engineer /notify /the engineer in charge.

5. Задайте вопросы к выделенным словам и словосочетаниям.

1. Factors to be taken into account in this matter will include **the type of ship, the type of machinery and degree of automation, etc.**
2. **At the beginning of the watch** the current operational parameters and the condition of all machinery should be verified.
3. During the watch **a log or record** will be taken of various parameters of main and auxiliary equipment.
4. This notification should preferably be given before any changes are made **to enable the bridge to take appropriate action.**
5. The bridge should be informed **as soon as possible.**

6. Переведите предложения с русского на английский язык.

1. Факторы, которые должны приниматься во внимание, будут включать в себя тип судна, тип машинного оборудования и степень автоматизации, квалификацию и опыт членов экипажа, несущих вахту.
2. Это будет включать в себя знание противопожарного оборудования, умение различать различные сигналы тревоги и предпринимать необходимые действия.
3. Через определенные промежутки времени должны проводиться осмотры главной силовой установки, вспомогательных механизмов и помещения, где находится рулевое устройство.
4. В дополнение к этим обычным задачам, от вахтенных может потребоваться выполнение других задач по ремонту или обслуживанию.
5. Когда в машинном отделении возникают ситуации, влияющие на скорость, маневренность, энергообеспечение, необходимо информировать мостик как можно скорее.

ВАРИАНТ 1

Read the text and translate it into Russian.

AUXILIARY DIESEL GENERATORS

In order to supply electric power and lighting, the ship is equipped with generators. Generators may be driven by a diesel engine, by a steam or gas turbine, or by the main propulsion engine as a shaft generator. The type of prime mover is determined by the design of the ship or by economic factors. Most generators are driven by diesel engines and produce rotating alternating current (AC). Electric power on board vessels is commonly generated at 440 volts or 380 volts. The voltage can be reduced to 220 volts or 110 volts by a transformer.

Electricity is a clean method of transporting energy. It consists of two basic types: direct current (DC) and alternating current (AC). A three-phase or rotating alternating current was developed from single alternating current. Voltage is measured in volts when the system is at rest. The frequency of the voltage is expressed in Hertz (Hz). Current transports an electrical charge from a high voltage to a lower voltage. It is measured in amperes.

A generator converts mechanical energy to electrical energy. This conversion is based on Faraday's law: an induction voltage is generated in a conductor when it encounters change of flux, i.e. when it is moving in a magnetic field or when it is in a moving magnetic field. The total induced electromotive force (EMF) in a generator is proportional to the flux and the speed of rotation.

A generator can produce either alternating current or direct current. A converter is used to convert AC to DC or from DC to AC. It may also change AC frequency. The basic components of the converter are diodes, transistors and thyristors. Generators are rated as Continuous Maximum Rated (CMR) machines. This means they can accept a considerable momentary overload and perhaps even a moderate overload for a longer duration.

The vast majority of the ships nowadays use 3-phase AC generators. DC generators are hardly ever found on board ships due to a number of disadvantages. A disadvantage of direct current systems is that the voltage from the generator, which is basically alternating voltage, is transformed into direct voltage by using commutators (collectors) and carbon brushes. These require extensive maintenance and become more complicated when the capacity is increased. The constant magnetic field created by direct current has to be transformed into a rotating field by a commutator and carbon brushes. The switch gear is also complicated and expensive. Consequently, if DC is required it is obtained with an AC generator in combination with a rectifier. New technologies actually have provided possibilities of brushless alternating current generators will built-in rectifiers that supply direct current.

1. Answer the following questions:

1. What may generators be driven by?
2. What electric power is usually generated on board vessels?
3. What types of current do you know?
4. What are the basic components of the converter?
5. What is the disadvantage of direct current system?

2. Fill the table:

Equipment	Function
Generator	
Transformer	
Converter	
Rectifier	

3. What do these abbreviations stand for?

AC, DC, EMF, Hz

4. Make up logical collocations: e.g. **direct current**

carbon	field
prime	law
electrical	force
magnetic	turbine
gas	charge
Faraday's	mover
electromotive	maintenance
extensive	brushes

5. Make up your own sentences using the words:

produce, voltage, conductor, overload, advantages.

6. Translate sentences from Russian into English:

1. Большинство генераторов приводятся в движение дизельными двигателями и производят переменный ток.
2. Генератор переменного тока имеет 3 комплекта катушек, называемых фазными обмотками, которые расположены в слоте статора с вращающимися магнитными полюсами.
3. Поле обмотки на роторе создает сильные магнитные поля полюсов, когда постоянный ток проходит через них.
4. Электродвижущая сила в генераторе пропорциональна потоку и скорости вращения.
5. Постоянное магнитное поле, создаваемое постоянным током, трансформируется во вращающееся поле посредством коммутатора и угольных щеток.

ВАРИАНТ 2

Read the text and translate it into Russian.

ELECTRIC MOTORS

Electric motors are used to actuate compressors, pumps, winches, fans, etc aboard ship. The electric motor converts electrical energy to mechanical energy. The most frequently used type of electric motor is the motor powered by an alternating current supply, i.e. AC motor. AC motors are not limited in the power they can produce. There are two main types of AC electric motors: asynchronous induction motors, which are widely used onboard ships and synchronous induction motors, which are rarely used onboard ships.

The advantage of asynchronous induction motor is the lack of vulnerable carbon brushes that require frequent maintenance. The disadvantages of asynchronous induction motor are the large amount of initial current that it requires and the low starting torque it produces. The synchronous AC motor is less popular because it is expensive and the carbon brushes require frequent maintenance; the advantages of the synchronous motor are the small amount of initial current it requires and its high starting torque. DC electric motors are powered by a direct current power supply and are not frequently used. They require commutator brushes and this limits their power output. They also require more maintenance than AC electric motors.

The most common type of electric motor is the three-phase AC cage-rotor induction motor. It is popular because it is simple, rigid and requires very little attention. Another advantage is that starting and stopping these motors can be done with simple and reliable direct-on-line contactor starters. Three phase induction motors are usually supplied at 440 (380) V, 60 (50) Hz, though 3.3 kV and 6.6 kV, 60 Hz are sometimes used for very large drives such as bow thrusters, cargo pumps, compressors and gas compressors.

Electric motors and generators are similar in construction. The main components of an electric motor are the stator and the rotor. The stator has three separate insulated phase windings which are spaced 120 degrees apart and lying in slots cut into a laminated steel magnetic core. The ends of the stator windings are terminated in the stator terminal box where they are connected to the incoming cable from the three-phase AC power supply.

The rotor consists of copper or aluminium conductor bars which are connected together at their ends by short-circuiting rods to form a cage winding. Such a rotor is called a squirrel cage rotor. The conductor bars are set in a laminated steel magnetic core. The induction motor having this type of simple, robust rotor which usually has no insulation on the conductor bars and doesn't have slip-rings, commutator and brushes, is the simplest electric motor and basically maintenance free.

1. Answer the following questions:

1. What is the function of an electric motor?
2. What types of AC electric motors do you know?
3. What are the disadvantages of DC electric motors?
4. Why is the three-phase AC cage-rotor induction motor popular?
5. What are the main components of an electric motor?

2. Fill the table:

Type of electric motor	Advantages	Disadvantages
Asynchronous induction motor		
Synchronous induction motor		

3. Make up logical collocations: e.g. **direct current**

electric	brushes
mechanical	motor
alternative	flux
carbon	maintenance
starting	thrusters
frequent	energy
bow	torque
magnetic	current

4. Make up your own sentences using the words:

amount, windings, insulation, require, actuate.

5. Translate sentences from Russian into English:

1. Преимуществом асинхронного индукционного мотора является отсутствие угольных щеток, которые требуют частого обслуживания.
2. Трехфазный индукционный мотор используется для носовых подруливающих устройств, грузовых насосов, воздушных и газовых компрессоров.
3. Недостатком асинхронного индукционного мотора является большое количество начального тока и низкий пусковой крутящий момент.
4. Электромоторы и генераторы схожи по конструкции, и их главными компонентами являются статор и ротор.
5. Ротор состоит из медных или алюминиевых шин, которые соединены вместе и образуют обмотку типа «беличья клетка».

ВАРИАНТ 3

Read the text and translate it into Russian.

EMERGENCY GENERATOR

In case of the failure of the main power generation system on the ship an emergency supply of electricity is required for essential services. The emergency power supply ensures that the essential machinery and system continues to operate the ship. This can be supplied by batteries, but most merchant ships have an emergency generator.

The emergency generator must be rated to provide power to the essential systems of the ship such as driving electric motors of the bilge pump, emergency fire pump, steering gear, starting air compressor, watertight doors and possibly fire-fighting equipment. Emergency lighting for occupied areas, navigation lights, communications systems and alarm systems must also be supplied. Where electrical control devices are used in the operation of main machinery, these too may require a supply from the emergency generator.

A switchboard, called emergency switchboard (ESWBD), in the emergency generator room supplies these various loads. It is not usual for an emergency generator to require paralleling, so no equipment is provided for this purpose. Automatic start up of the emergency generator at a decreased voltage signal from the mains (MSWBD) is required.

Emergency generator is normally located outside the machinery space of the ship, at the remote distance from the engine room and usually above the bulkhead deck, that is at the weather (poop) deck level or above. This is done mainly to avoid those emergency situations wherein access to the engine room is not possible. An emergency switchboard in the emergency generator room supplies power to different essential machinery. The emergency generator is a diesel-driven generator of sufficient capacity to provide essential circuits such as steering, navigation lights and communications. The diesel engine has its own supply system, usually of light diesel oil for easy starting. Batteries, compressed air or a hydraulic accumulator may be used for starting the machine (two independent starting systems are required). Small machines may be air cooled but larger units are arranged usually for water cooling with an air cooled radiator as heat exchanger in the system. A small switchboard (ESWBD) is located in the same compartment to connect the supply to the various emergency services.

Modern systems are arranged to start the emergency generator automatically when the main power supply fails (as it was described above). The system should be checked regularly and operated to ensure availability if required. Fuel tanks should be kept full, ample cooling water should be in the radiator cooling system, and the starting equipment should be functional. Batteries of course, should be fully charged or air receivers full.

1. Answer the following questions:

1. What is the function of an emergency generator?
2. What essential systems of the ship require a supply from the emergency generator?
3. Where is the emergency generator located?
4. Does the diesel engine have its own supply system?
5. What equipment should be checked regularly?

2. What do these abbreviations stand for?

ESWBD

MSWBD

3. Make up logical collocations: e.g. **direct current**

emergency	devices
watertight	lights
navigation	deck
control	water
voltage	tanks
cooling	generator
weather	doors
fuel	signal

4. Make up your own sentences using the words:

failure, supply, switchboard, capacity, circuit.

5. Translate sentences from Russian into English:

1. Аварийный генератор должен обеспечивать подачу электроэнергии к электромоторам трюмного и пожарного насосов, рулевому устройству, пусковому воздушному компрессору, водонепроницаемым дверям и противопожарному оборудованию.
2. Дизельный двигатель имеет свою собственную систему снабжения легким дизельным топливом для быстрого и легкого запуска.
3. Батареи, сжатый воздух или гидравлический аккумулятор могут использоваться для запуска механизмов.
4. Топливные танки должны быть всегда заполнены, достаточное количество охлаждающей воды должно быть в радиаторе охлаждающей системы, и пусковое оборудование должно быть в рабочем состоянии.
5. Аварийный распределительный щит подает электроэнергию к аварийным устройствам и механизмам в случае выхода из строя основной системы.

ВАРИАНТ 1

Read the text and translate it into Russian.

DIESEL ELECTRIC PROPULSION PLANT

Electric propulsion system offers numerous advantages for ships that are subject to specific requirements. They are rated as particularly economical, environmentally friendly and reliable, offer considerable comfort in terms of operation and control, have optimal maneuvering and positioning properties, low vibration and noise levels.

The electrical side of all systems is based on a direct current or an alternating current motor, coupled to the ship's propeller shaft, with the speed and direction of propeller rotation being governed by electric control of the motor itself or by the alternation of the power supply.

The electric propulsion arrangement for a ship is characterized only by the type of prime mover with no reference to the type of electric propulsion motor. When the prime mover is a diesel engine, then it is called diesel-electric propulsion. The diesel electric propulsion system is not a new concept, it has a long history. In the past these systems were usually diesel engine driven DC generators that supplied power to DC motors. Their applications were generally limited to vessels that required a degree of low speed maneuvering.

Passenger vessels have always been the largest and most glamorous ships using electric propulsion. Such vessels as tugs, dredgers, trawlers, lighthouse tenders, cable ships, ice breakers, research ships, floating cranes, and vessels for the offshore industries have also been and are built with electric propulsion. It should be mentioned that electric-drive systems have made substantial progress in recent years.

The propulsion system of a vessel provides thrust to move the vessel. Conventional propellers, controllable pitch propellers, azipods, transverse tunnel thrusters, and low speed water jet systems can be driven with equal effectiveness by a diesel-electric system.

The two types of diesel electric propulsion system dominating the market today are frequency controlled AC Motors and SCR controlled DC Motors.

Modern SCR and frequency controlled systems have efficiency approaching 97% in power conversion. The selection of one over the other is an application issue. The deep draft cruise ship industry, due to the high hotel-like power requirements, is adopting high-power diesel electric propulsion systems in most of its new builds.

1. Answer the following questions:

1. What are advantages of electric propulsion system?
2. What is the electrical side of all systems based on?
3. What ships are usually built with electric propulsion?
4. What gears can be driven by diesel-electric system?
5. What types of diesel electric propulsion system dominate the market today?

2. Match these words to their definitions:

vibration	to provide
noise	rate of movement/action
supply	a continuous shaking movement
speed	a device with two or more long, flat blades that turn quickly and cause a ship or an aircraft to move forward
propeller	a sound, especially when it is loud, unpleasant or frightening

3. Put the words in the correct order to make sentences:

1. enhance / maneuverability / ship / azipods / significantly.
2. systems / propulsion / electric / economical / are / friendly / and / environmentally / reliable.
3. rotated / be / can / azipods / 360 degrees / through.
4. hull / reduce / vibration / propulsion / external / units.

4. Make up your own sentences using the words:

reliable, maneuvering, propeller shaft, dredgers, azipods.

5. Translate sentences from Russian into English:

1. Электрическая пропульсивная система состоит из первичного двигателя, который может быть двух типов: дизельным или турбинным.
2. Система аzipод увеличивает маневренность судна и уменьшает вибрацию корпуса.
3. Дизельная электрическая пропульсивная система производит меньше загрязнения, чем обычные морские пропульсивные системы, которые сжигают тяжелое топливо.
4. Гребной вал соединен с большими моторами, которые могут использовать постоянный или переменный ток.
5. Электроэнергия для пропульсивных моторов переменного тока подается генератором переменного тока, а первичными двигателями являются дизельные двигатели.

ВАРИАНТ 2

Read the text and translate it into Russian.

AUXILIARY TURBOGENERATORS

Auxiliary steam turbines are used in turbo-generator sets. Power outputs vary up to about 1.5 MW for generator sets. The single or compound (multi-stage) stage turbines can be arranged horizontally or vertically. Both condensing and back pressure turbines have been used, being designed for steam conditions ranging from about 6 bar to about 62 bar at 510°C.

Turbo-generators are also fitted in many motor ships in conjunctions with wash heat recovery schemes, based on using the exhaust from very large and powerful slow, speed diesels. Diesel engine builders have developed engines with great powers for propulsion in response to the shipowners demand and also in competition with steam turbines. Diesels are now used almost exclusively for modern ships. Only for liquefied gas carriers where the gas boil-off can be burned in the boilers, are steam turbines still being installed.

For electrical power generation, turbines are conventionally horizontal axial flow machines of the impulse reaction type. They may exhaust either to an integral condenser (invariably underslung) or to a separate central auxiliary condenser or the ship's main condenser. The turbine may be a back-pressure unit in which the exhaust is used as a source of low pressure steam for other services. The casings, split horizontally and supporting the rotors in plain journal bearings are cast mild steel or, for temperatures exceeding 460 C they are of 0.5% molybdenum steel, with cast or fabricated mild steel for parts not subject to high temperatures. Solid gashed rotors of chrome-molybdenum alloy steel are usual though some may be encountered having rotor spindles of this alloy, with shrunk and keyed bucket wheels. Blades may be of stainless iron, stainless steel or monel alloy, with shrouded tips, fitted into the rotors in a number of root forms.

Depending on steam conditions and power the turbine will have a two row velocity compounded stage followed by a suitable number, probably five or more, single row pressure compounded stages, each separated by a cast steel nozzle. Steam enters the turbine at the free end via a cast steel nozzle box and flows towards the drive end which is connected to the pinion of the reduction gearing by a fine tooth or other flexible coupling designed to accommodate longitudinal expansion of the rotor. Typical rotating speed of the rotor is about 6500 rev/min. The diaphragms separating each stage are split horizontally and fitted in grooves in the casing. The diaphragms may be of steel or cast iron depending on the stage pressure. Interstage leakage, where the rotor shaft passes through the diaphragm, is minimized by labyrinth glands of a suitable non-ferrous alloy such as nickel-bronze.

1. Answer the following questions:

1. Where are auxiliary steam turbines used?
2. What turbine types do you know?
3. Where may the turbines exhaust to?
4. What are blades usually made of?
5. What is the typical rotating speed of the rotor?

2. Match these words to their definitions:

steam	the gas that water produces when you heat it
condenser	a device that cools gas in order to change it into a liquid
velocity	the speed of something in a particular direction
flexible	able to bend easily without breaking
nozzle	a narrow piece that is attached to the end of a pipe or tube to direct the stream of liquid, air or gas passing through

3. Put the words in the correct order to make sentences:

1. can be / compound stage turbines / horizontally / arranged / or / vertically.
2. for / may / also / be / used / labyrinth packing / the turbine shaft glands.
3. enters / the turbine / via / a cast steel nozzle / steam / flows / and / towards / the drive end.
4. divided / the low pressure labyrinth / into / three / separate / is / groups.

4. Make up your own sentences using the words:

Shipowner, split, alloy steel, grooves.

5. Translate sentences from Russian into English:

1. Одноступенчатые или многоступенчатые турбины могут быть установлены горизонтально или вертикально.
2. Для производства электроэнергии используются импульсные турбины с горизонтально осевым потоком.
3. Пар поступает в турбину через корпус форсунки из литой стали и направляется к приводному концу, который соединен с шестерней редуктора с помощью зуба или другой гибкой муфты.
4. Диафрагмы установлены в канавках в корпусе и могут быть из стали или чугуна, в зависимости от давления в ступени.
5. Межступенчатая утечка уменьшается благодаря лабиринтным сальникам из подходящего цветного сплава, например из никелевой бронзы.

ВАРИАНТ 3

Read the text and translate it into Russian.

SHAFT GENERATORS

To eliminate the usage of independently driven generators when the ship is underway, shaft generator concept is used. A shaft generator is a particularly efficient way to produce electric power onboard, especially when combined with the use of a controllable pitch propeller. Shaft generators are mainly suitable for those ships that are equipped with large low-speed engines. In this case the device is mounted on the propeller-driving intermediate shaft to drive the ship's generator via a stepped-up gearing. Medium-speed fourstroke main engines with shaft generators and CPP installations have been favoured in the last decades.

The shaft generator extracts electric power from the ship's main engine. Consequently, the power is derived from lower cost fuel than that used for an auxiliary diesel generator. The shaft generator may be fitted directly in-line or, what is more common, it may be gear-driven up to a higher speed. By using a shaft generator as the main source of electric power during long sea passages, the diesel generator operates for short periods only. Consequently, maintenance requirements for diesel generators are reduced.

In general terms, a shaft generator requires:

- A winding or a group of coils in which the desired voltage is to be induced. This is the armature winding and the structure containing this winding is the armature.
- A magnetic field which may be produced by permanent magnets or the flux which may be created by a separate winding, in this case the field winding.
- Rotation, which causes continuous change in the amount of flux linking the coils of the armature.

The main two parts of a shaft generator are the stator and the rotor. The rotor is a rotating electro-magnet which produces a magnetic field. It rotates within the stator. A stator is a tube of coiled copper wire. The rotor, a permanent magnet, rotates inside this tube. The desired voltage is developed in the stator around this magnet. The excitation methods can be either rotary or static. A rotary method utilizes an AC or DC exciter and rotates with the rotor of the main generator. In past, rotary exciters were DC generators with stationary field poles, rotating armature, commutator and brushes. Now the most common arrangement is to use a shaft mounted AC exciter. In some applications, a small additional rotary pilot exciter is used to supply current to the main exciter field. A pilot exciter is a small permanent magnet AC generator which is driven from the generator shaft. Its output voltage is generally at high frequency, e.g. 1000 Hz, however, this is rectified to DC before being fed into the main exciter field.

1. Answer the following questions:

1. What is the function of shaft generators?
2. What ships are usually equipped with shaft generators?
3. What does a shaft generator require in general terms?
4. What is a rotor?
5. What excitation methods do you know?

2. Match these words to their definitions:

device	providing extra help or support
auxiliary	a substance that is burned to provide heat or power
fuel	a piece of equipment that is used for a particular purpose
maintenance	a long piece of wire, rope, etc curled into several circles
coil	keeping something in good condition by repairing it regularly

3. Put the words in the correct order to make sentences:

1. heavy fuel oil / possible / it's / to use / generation / for / power.
2. the shaft / mounted / of / the shaft generator / are / the poles / directly / on.
3. may be / to provide / used / a hydraulic pump / a constant-speed drive / and / gearbox.
4. a tube / of / a stator / is / coiled copper wire.

4. Make up your own sentences using the words:

Shaft generator, onboard, source, winding, stator.

5. Translate sentences from Russian into English:

1. Валогенераторы являются эффективным способом производства электроэнергии на борту судна совместно с использованием винта регулируемого шага.
2. При использовании валогенератора как основного источника электроэнергии во время долгих морских переходов дизель-генераторы работают только короткими периодами.
3. Магнитное поле может создаваться постоянным магнитом или потоком, который создается полем обмотки.
4. В больших малооборотных двигателях полюса валогенератора устанавливаются прямо на валу.
5. Ротор – это вращающийся электромагнит, который создает магнитное поле и вращается в пределах статора.

ВАРИАНТ 1

Перепишите и письменно переведите текст на русский язык.

ELECTRIC PROPULSION SCHEME

Electric propulsion of ships has a long history. There have been periods when it has enjoyed popularity, with a significant number of installations being undertaken, while at other times it has been virtually ignored as a drive system.

Passenger ships have always been the largest commercial vessels with electric propulsion systems, but a wide variety of vessels have been, and are, built with electric propulsion.

Early large passenger vessels employed the turboelectric system, which involved the use of variable speed, and therefore variable frequency, turbo-generator sets for the supply of electric power to the propulsion motors, directly coupled to the propeller shafts. The generator/motor system acted as a speed reducing transmission system. Electric power for auxiliary ship services required the use of separate constant frequency generator sets.

A system that has generating sets that can be used to provide power to both the propulsion system and ship services has clear advantages, but this would have to be a fixed voltage and frequency system to satisfy the requirements of the ship service loads. The provision of high power variable speed drives from a fixed voltage and frequency supply has always presented problems. In addition, when the required propulsion power was beyond the capacity of a single DC motor, there was the complication of multiple motors per shaft.

There are reasons why, for some installations, it is possible to justify the complication of electric propulsion and these include:

- flexibility of layout;
- load diversity between ship service load and propulsion;
- economical part-load running;
- ease of control;
- low noise and vibration characteristics.

Flexibility of layout

An advantage of an electric transmission is that the prime movers, and their generators, are not constrained to have any particular relationship with the load as a cable run is a versatile transmission medium. In a ship propulsion system, it is possible to mount the diesel engines, gas turbines, etc. in locations best suited for them and their associated services, so they can be remote from the propeller shaft.

Load diversity

Certain types of vessels have a requirement for substantial amounts of electric power for ship services when the demands of the propulsion system are low.

Economical part-load running

This is best achieved when there is a central power generation system feeding propulsion and ship services. It is likely that a typical installation would have between four and eight diesel generator sets and, with parallel operation of all the sets, it becomes very easy to match the available generating capacity to the load demand.

The propulsion regulator will continuously monitor the present generator capability and any generator overload will immediately result in controlled power limitation to the propulsion motors. During maneuvering, propulsion power requirements are below system capacity and failure of one generator is not likely to present a hazardous situation.

Ease of control

The widespread use of controllable pitch propellers (CPP) has meant that the control facilities that were so readily available with electric drives are no longer able to command the same premium. Electric drives are capable of the most exacting demands with regard to dynamic performance which, in general, exceed by a wide margin anything that is required of a ship propulsion system.

Low noise

An electric motor is able to provide a drive with very low vibration characteristics and this is of importance in warships, oceanographic survey vessels and cruise ships. With warships and survey vessels, it is noise into the water that is the critical factor, while with cruise ships, it is structure-borne noise and vibration to the passenger spaces that has to be minimized.

1. Answer the following questions:

1. What vessels are built with electric propulsion system?
2. What did the turboelectric system involve onboard early passenger vessels?
3. What did electric power for auxiliary ship services require?
4. What are requirements for the system that has generating sets?
5. What are the reasons to justify complication of electric propulsion?
6. What is the advantage of electric transmission?
7. Explain the term "load diversity".
8. How many diesel generators sets does a typical installation have?
9. Why is it easy to match the available generating capacity to the load demand?
10. What is the critical factor for the warships to be minimized?

2. Match the verb with its meaning and make your own sentences using the verbs.

1. to repair	a. to put all the parts of something together
2. to connect	b. to fix something that is damaged, broken, or not working properly
3. to lower	c. to take a machine or piece of equipment apart so that it is in separate pieces
4. to assemble	d. to remove dirt from something by rubbing or washing
5. to disassemble	e. shut something so that there is no longer a space or hole
6. to clean	f. to join two or more things together
7. to close	g. to reduce something in amount, degree, strength etc., or to become less; to move something down from higher up

3. Translate the dialog.

A: So what else has to be done?

B: Необходимо заменить лопасть ВРШ.

A: Isn't it included in the list of repairs?

B: Нет. Поломка ВРШ произошла у нас на промысле в районе Лабрадора, где много плавающего льда.

A: And what about the bulwark? Much work to do?

B: Фальшборт мы повредили при швартовке в открытом море. Ремонт несложный, но предстоят большие сварочные работы.

A: I must see the damage myself.

B: Хорошо. Сюда, пожалуйста.

4. Translate words from Russian into English:

Бронированный кабель, матовый плафон, пункт № 5, уровень изоляции, утечка, осушительный и пожарный насосы, перемотать, объем ремонтных работ, вышедшие из строя водогрейные трубки, трубки оголены в верхней части, тестомесительная машина, предварительная информация, ремонт всей арматуры и автоматических приборов, камбуз, датчики и индикаторы, поршневые кольца, недостаток воды, требуют замены, сварочные работы, пульт управления, список запчастей, влажные условия, фальшборт, палубные механизмы, жаростойкие трубы, главный распределительный щит, детально обсудить, цилиндр, лопасть ВРШ, паровой котел.

5. Translate sentences from Russian into English:

1. Универсальный электродвигатель переменного тока может работать и на постоянном, и на переменном токе, и используется в маленьких электроприборах.
2. Роторы асинхронного двигателя переменного тока могут быть двух видов: короткозамкнутый и фазный ротор (беличья клетка).
3. Аварийный распределительный щит имеет те же функции, что и главный распределительный щит, но для аварийного генератора.
4. Якорь имеет катушки, в которых вырабатывается электричество.
5. Электродвигатель переменного тока состоит из двух частей: внешний стационарный статор и внутренний ротор.
6. Электрический генератор – это устройство, которое преобразует механическую энергию в электрическую.
7. Генератор переменного тока работает по тому же принципу электромагнитной индукции, что и генераторы постоянного тока.
8. Каждый генератор приводится в движение первичным двигателем: турбиной или дизельным двигателем.
9. Распределительные щиты используются для контроля, защиты, управления работой электроустановок и для измерения параметров источников электропитания.
10. Генератор имеет две основные части: якорь и индукторную станину.

ВАРИАНТ 2

Перепишите и письменно переведите текст на русский язык.

BATTERY SUPPLIES

A properly maintained storage battery will instantly supply electric power when required. This feature makes a battery the key element in the provision of essential and emergency power supplies on board ships.

Essential routine power supplies, e.g. for radio equipment, telephone exchange, fire detection, general alarm circuits, are often supplied from a set of batteries worked on a regular charge/discharge cycle.

Emergency battery supplies, e.g. for emergency generator startup and emergency lighting, are used in a standby role to give power when the main supply fails. Ships' batteries are usually rated at a nominal voltage of 24 V DC.

The two main types of rechargeable battery cell are:

- Lead-acid;
- alkaline.

The nominal cell voltages of each type are 2 V for lead-acid and 1.2 V for alkaline. Twelve lead-acid cells or twenty alkaline cells must be connected in series to produce a nominal 24 V. More cells may be connected in parallel to increase the battery capacity, which is rated in ampere-hours (Ah). The battery capacity is usually rated in terms of its discharge at the 10 hour rate. A 350 Ah battery would be expected to provide 35 A for 10 hours. However, the battery will generally have a lower capacity at a shorter discharge rate. The manufacturer's discharge curves must be checked for such details.

After a 10 hour discharge, a lead-acid cell voltage will have fallen to approximately 1.73 V. The equivalent figure for an alkaline cell is 1.14 V.

Battery installations for both types of battery are similar in that the battery room should be well ventilated, clean and dry. Both types generate hydrogen gas during charging, so smoking and naked flames must be prohibited in the vicinity of the batteries.

Steelwork and decks adjacent to lead-acid batteries should be covered with acid-resisting paint. Alkali-resisting paint should be used near Ni-cad cells. Acid cells must never be placed near alkaline cells because of the risk of rapid electrolytic corrosion to metalwork and damage to both batteries. For similar reasons, never use lead-acid battery maintenance gear (e.g. hydrometer, topping up bottles, etc.) on an alkaline installation, or vice versa.

Battery maintenance includes keeping the cell tops clean and dry, checking the tightness of terminal nuts and applying a smear of petroleum jelly to connections to prevent corrosion.

Be careful when handling the battery electrolyte (e.g. when using a hydrometer to check its specific gravity). Use protective rubber gloves and eye

goggles when handling electrolyte. Insulated spanners should be available for use on cell connections to prevent accidental short-circuiting of battery terminals. A short-circuit across the terminals of just one cell of a battery will cause a blinding flash, with the probability of the cell being seriously damaged.

1. Answer the following questions:

1. What makes a battery the key element in the provision power supplies on board ships?
2. What equipment is supplied from a set of batteries worked on a regular charge/discharge cycle?
3. When are emergency battery supplies used?
4. What is a nominal voltage of batteries used onboard?
5. What main types of rechargeable battery cell do you know?
6. What is the nominal cell voltage of alkaline battery?
7. What could be done to increase the battery capacity?
8. What are requirements for the battery room?
9. Why is it prohibited to place acid cells near alkaline cells?
10. What does the battery maintenance include?

2. Match the verb with its meaning and make your own sentences using the verbs.

<ol style="list-style-type: none"> 1. to fix 2. to drain 3. to fill 4. to check to examine 5. to lift 6. to tighten 	<ol style="list-style-type: none"> a. to repair something that is broken or not working properly b. to take something in your hands and raise it, move it, or carry it somewhere; c. look at something carefully in order to make a decision, find something d. to make the water or liquid flow away from something e. to put the right amount of liquid, substance, or material into a container, or put in enough to make it full f. to do something in order to find out whether something that you think is correct, true, or safe really is correct, true, or safe g. to close or fasten something firmly by turning it
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3. Translate the dialog.

A: What machinery will operate in the engine room during repair works?

B:осушительный и пожарный насосы будут работать постоянно.

A: Is your shore-supply board in good condition?

B: Щит в хорошем состоянии. Нас больше беспокоит кабель.

A: What's the problem?

В: Кабель короткий, около 10 метров, а судно стоит довольно далеко от электропитания с берега.

А: All right. We will provide you with the cable of necessary length.

4. Translate words from Russian into English:

Предохранительный клапан, система подачи, питательный кабель, электроплита, электрические нагревательные элементы, автоматический выключатель, вспомогательный дизель-генератор, машинное отделение, выхлопной клапан, питание с берега, быть в наличии, забортная арматура, представитель ремонтного отдела, соединять, зачистка водяной и огневой сторон, рабочие условия, деформирован, поршень, демонтаж и сборка, профилактический ремонт, палубный светильник, контакты и крепежи, распределительная коробка, ремонтная ведомость, плавучие льды, картофелечистка, главный двигатель, подавать энергию (питать), заменить мотор, балластный насос.

5. Translate sentences from Russian into English:

1. Электродвигатель постоянного тока вращается в результате взаимодействия двух магнитных полей.
2. Как и генератор постоянного тока, электродвигатель постоянного тока имеет полюса, которые неподвижны и якорь, который вращается в пространстве между полюсами.
3. Главные полюса производят основное магнитное поле.
4. Ремонт машин постоянного тока может быть произведен двумя путями, когда полюсы машины удалены, и полюсы машины не удалены.
5. Количество напряжения зависит от количества проводников, скорости и силы магнитного поля.
6. Главный распределительный щит контролирует, защищает, регулирует основные параметры генератора и распределяет электричество.
7. В генераторах постоянного тока с параллельным возбуждением катушка состоит из витков проволоки маленького диаметра и соединенных с якорем параллельно нагрузке.
8. Лист ремонтных работ должен включать регистрационный сертификат машины, количество поломок и ремонтных работ, все необходимые материалы, запасные части и кабельные комплектующие.
9. Существуют силовые трансформаторы, трансформаторы для специальных целей и автотрансформаторы.
10. Существуют три типа генераторов постоянного тока: с последовательным возбуждением, с параллельным возбуждением и со смешанным возбуждением.

ВАРИАНТ 3

Перепишите и письменно переведите текст на русский язык.

NAVIGATION LIGHTS AND EMERGENCY LIGHTING

The number, position and visible range of navigation lights on board ships is prescribed by the International Maritime Organization (IMO) in the 'International Regulations for Preventing Collisions at Sea' (COLREGs).

The most common arrangement is to have five specially-designed navigation running lights referred to as foremast, mainmast (or aftmast), port, starboard and stern. Two anchor lights, fitted forward and aft, may also be switched from the navigation light panel on the bridge. The side lights are red for port and green for starboard, while the other lights are white. For vessels of more than 50 metres in length, the masthead light(s) must be visible from a range of 6 nautical miles and the other navigation lights from 3 nautical miles. To achieve such visibility, special incandescent filament lamps are used, each with a typical power rating of 65 W, but 60 W and 40 W ratings are also permitted in some cases.

Due to the essential safety requirement for navigation lights, it is common practice to have two fittings at each position, or two lamps and lampholders within a dual fitting. Each light is separately supplied, switched, fused and monitored from a navigation light panel in the wheelhouse. The electric power is usually provided at 220 V AC, with a main supply fed from the essential services section of the main switchboard.

An alternative or standby power supply is fed from the emergency switchboard. A changeover switch on the navigation light panel selects the main or standby power supply. The navigation light panel has indicator LEDs and an audible alarm to warn of any lamp or lamp circuit failure. Each lamp circuit is monitored by the electronic circuit for the lamp current. Various signal lights with red, green and white colours are arranged on the signal mast. These lights are switched in combinations that signal states relating to various international and national regulations. Pilotage requirements, health, dangerous cargo conditions, etc. are all signalled with these lights. White morse code flashing lights may also be fitted on the signal mast. The NUC (Not Under Command) state is signalled using two all-round red lights vertically mounted at least 2 m apart.

Depending on the ship's Classification and tonnage, the Safety of Life at Sea (SOLAS) Convention prescribes requirements for emergency lighting throughout the vessel. Most of the emergency lighting is continually powered from the ship's emergency switchboard at 220 V AC. Emergency lights at the staircases and through the escape route may be supplied from the ship's 24 V DC battery supply.

The main and emergency lighting systems sources of electrical power, associated transformers, switchboards and central lighting distribution panels must

be arranged so that a fire or other incident would not cause the failure of both systems, i.e. the components of the main and emergency lighting systems must not be located in the same rooms. If the main power supply fails, the emergency lighting system must switch on automatically.

Passenger ships and RoRo passenger ships must also be fitted with a special battery-supported emergency lighting system along main escape routes in the engine room and accommodation and at the lifeboat positions on deck. Passenger ships carrying more than 36 passengers are required to be fitted with low location lighting (LLL) to identify escape routes where normal emergency lighting is less effective due to the presence of smoke. A LLL system must function for at least 60 minutes after activation and it should indicate a line along the corridors of an escape route.

1. Answer the following questions:

1. Who establishes the rules for the number, position and visible range of navigation lights on board ships?
2. What navigation lights can be switched from the navigation light panel?
3. What is a typical power rating for lamps used in navigation lights?
4. What is the function of the indicator LEDs and an audible alarm?
5. How is the Not Under Command state signaled?
6. Where does the electric power for emergency lighting come from?
7. What is the ship's 24 V DC battery supply used for?
8. Why must the components of the main and emergency lighting systems be located in the different rooms?
9. What must passenger ships and RoRo passenger ships be fitted with?
10. How long should a low location lighting system function after activation?

2. Match the verb with its meaning and make your own sentences using the verbs.

<ol style="list-style-type: none"> 1. to overhaul 2. to lubricate 3. to measure 4. to move 5. to replace 6. to take off 	<ol style="list-style-type: none"> a. to repair or change all the parts that need it, in a machine, system etc, that is not working correctly b. to remove something, especially a piece of clothing c. to find the size, length, or amount of something using standard units d. to get something new to put in the place of something that has been broken, etc. e. to change your place or position, or to make something do this f. to put a lubricant on something in order to make it move more smoothly
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3. Translate the dialog.

A: What electrical equipment has to be replaced?

B: Необходимо заменить палубные светильники и распределительные коробки. Остальное оборудование мыотремонтируем сами.

A: What lamps do you need?

B: Нам нужны матовые плафоны с двумя лампочками.

A: I suppose that after fitting the lamps the cabins will need some painting, won't they?

B: Да. Включите это в стоимость замены светильников, пожалуйста.

A: OK. Anything else concerning the electrical equipment?

B: Нет. Это все.

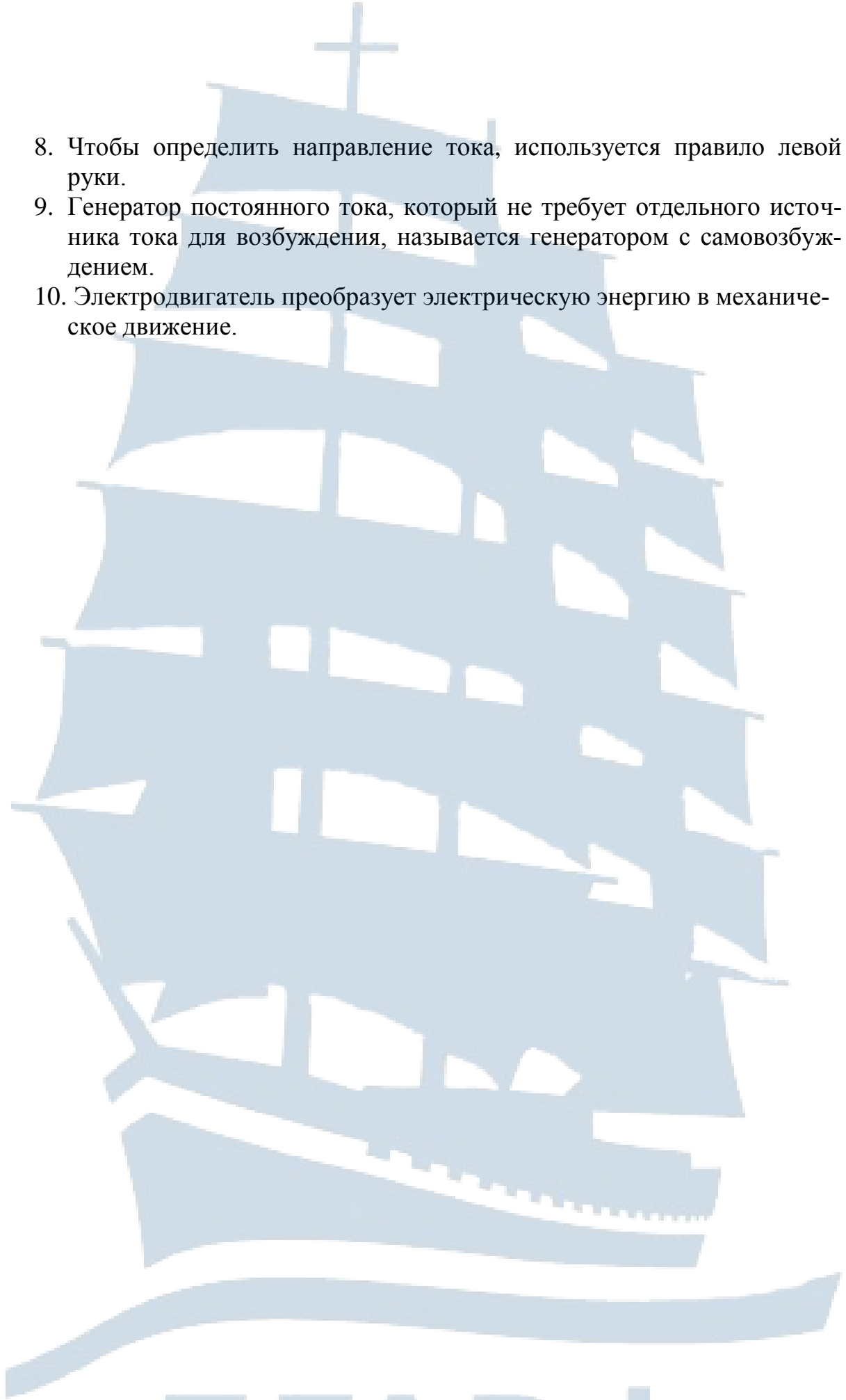
4. Translate words from Russian into English:

Ремонт всей арматуры и автоматических приборов, забортная арматура, осушительный и пожарный насосы, дополнительная работа, главный двигатель, деформирован, автоматический выключатель, лопасть ВРШ, машинное отделение, детально обсудить, палубные механизмы, пункт № 5, профилактический ремонт, трубы оголены в верхней части, вспомогательный дизель-генератор, рабочие условия, обеспечивать, матовый плафон, требуют замены, электроплита, вышедшие из строя водогрейные трубы, предварительная информация, датчики и индикаторы, поршневые кольца, пульт управления, зачистка водяной и огневой сторон, картофелечистка, камбуз, жаростойкие трубы, список запчастей.

5. Translate sentences from Russian into English:

1. В генераторах постоянного тока с последовательным возбуждением обмотка соединена последовательно с якорем.
2. Скорость и направление вращения электродвигателя постоянного тока может контролироваться, поэтому он используется для управления лебедками.
3. Синхронный электродвигатель переменного тока сконструирован для поддержания постоянной скорости ротора синхронно с вращающимся полем.
4. После ремонта или долгого простоя электрические машины должны быть протестированы до запуска.
5. Судовая электроустановка – это система для производства электричества.
6. Асинхронный электродвигатель переменного тока имеет ротор, который не соединен с внешним источником напряжения.
7. Для мощных приборов используется трехфазный электродвигатель переменного тока.

8. Чтобы определить направление тока, используется правило левой руки.
9. Генератор постоянного тока, который не требует отдельного источника тока для возбуждения, называется генератором с самовозбуждением.
10. Электродвигатель преобразует электрическую энергию в механическое движение.



ВАРИАНТ 1

Перепишите и письменно переведите текст на русский язык.

PROPULSION SYSTEM OPERATION

The operation of a propulsion system is based on a diesel-electric arrangement with synchroconverter frequency control. For a large ship, the power system will employ HV generation.

In this example, each 12 MW, 3 kV propulsion motor has two separate 6 MW stator windings and each half winding is supplied from a 6.6/3.0 kV propulsion transformer and a static 6-pulse synchroconverter. The 24-pole motors have a shaft speed range of 0-145 rev/min controlled from the converter output frequency range of 0-29 Hz.

By using two converters feeding two separate stator windings fitted 30° apart, a 12-pulse shaft torque is achieved to minimize shaft vibration. A more complicated arrangement of supply transformers and converters can produce a 24-pulse shaft torque.

Motor brushless excitation is also obtained from the HV busbars via a 6.6/0.44 kV static transformer, a thyristor controller, an AC/AC rotary transformer (inside the motor) and a set of shaft-mounted diodes for the final conversion to DC.

Control throttle stations for both shafts are installed on the bridge (in the wheelhouse and on the wings), engine control room and local (in HV switchboard room) positions. At sea, the shaft speed commands are set from the bridge and repeated in the ECR. In port, the control position is transferred to the ECR. The local control position is mainly used for testing and maintenance duties, but also acts as an emergency control station. Selection of the command position is determined by a switch on the propulsion console in the ECR.

An emergency telegraph giving set speed commands (dead-slow, half-ahead, etc) is available at each control station. The ship propulsion regulator and side thruster regulators can be combined into a master joystick controller to give overall directional control for accurate manoeuvring in port.

In a synchrodrive system, the central processing unit receives a command (set speed) input and many feedback signals (voltage, current, power, frequency, etc), but the main regulating item is the actual shaft speed feedback forming a closed control loop. The principal parameters to be controlled are the size of motor stator current (to set motor torque) and the motor frequency to set the shaft speed. In addition, the DC motor field current has to be continually controlled from the propulsion regulator via the excitation converter.

Speed and position are derived from detectors on the non-drive end of the motor shaft. At speeds of less than 10%, the motor does not generate sufficient back EMF to cause automatic thyristor switch-off (line commutation).

For normal running, above about 10% speed, the operation is switched to synchronous mode where the thyristors in both bridges are switched off naturally (line commutated) by their live AC voltages from supply and motor.

To reverse the shaft rotation, the forward/ahead phase sequence of motor supply currents is reversed by the inverter thyristors. This reverses the direction of stator flux rotation and therefore shaft direction to astern. The rate of deceleration to zero speed must be carefully controlled before a shaft reversal to avoid large power surges in the system.

For a motor braking operation, the inverter bridge can be considered as a rectifier bridge when viewed from the live AC supply produced by the motor EMF. If the network (rectifier) bridge thyristors are switched with a delay angle greater than 90° , the DC link voltage reverses, causing power flow from the motor back to the supply (motor braking). In this mode, the roles of the network and machine bridges are swapped over.

Overall system power control is provided by a PLC-based power management system (PMS) that effectively coordinates power demand with its supply.

Broadly, the PMS functions are:

Control of:

- automatic power limitation for propulsion motors
- auto start, synchronising and load sharing of standby generators
- control of regeneration from the propulsion motors during braking and reversing manoeuvres
- power limitation for main generators
- load shedding by preferential tripping
- dynamic limitation of propulsion motor acceleration.

Monitoring of:

- load sharing
- diesel performance
- proposal to start/stop a generator
- running time for generators and propulsion motors
- status and data display
- safety performance.

1. Answer the following questions:

1. What is the operation of a propulsion system based on?
2. What is used to achieve 12-pulse shaft torque and minimize shaft vibration?
3. Where are control throttle stations for shafts installed?

4. What device determines the selection of the command position?
5. What principal parameters should be controlled in a synchrodrive system?
6. What are the speed and position derived from?
7. What device is used to reverse the shaft rotation?
8. What provides overall system power control?
9. What control functions of PMS (power management system) do you know?
10. What should be monitored by PMS (power management system)?

2. Translate the dialog.

A: По-моему, вспомогательные двигатели уже опробованы в работе, не так ли?

B: Yes, you are right. They have been tested under load.

A: А что с главным двигателем? Готов ли он к испытанию в рабочих условиях?

B: You see, the main engine still needs the final assembly.

A: Скажите, пожалуйста, что еще осталось сделать?

B: Well, the cylinder heads are to be fitted and, besides, the cooling system and the starting air system are to be installed.

A: Когда планируется запуск двигателя?

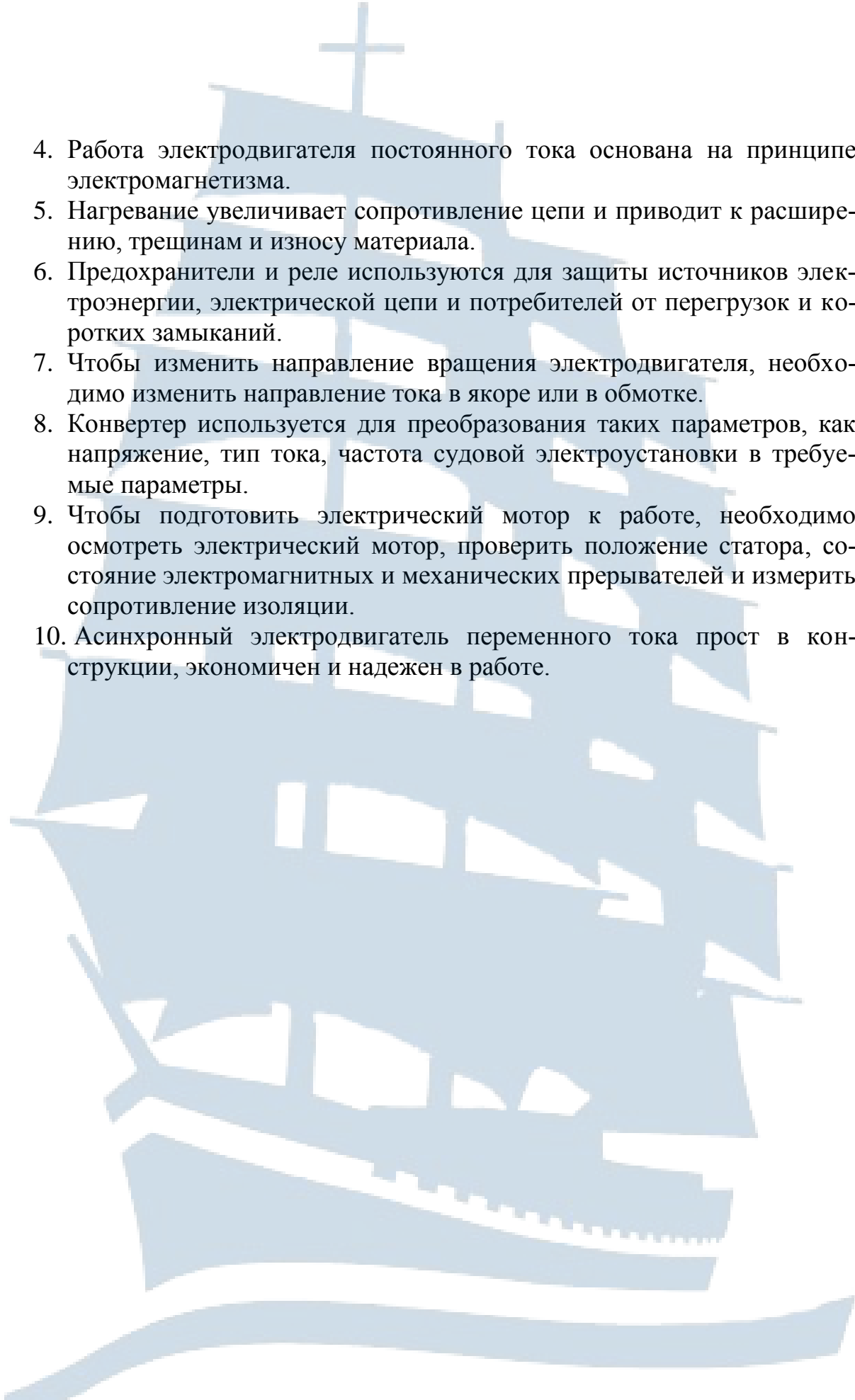
B: I hope, we will be ready for starting the main engine in a fortnight.

3. Translate words from Russian into English:

Испытание в рабочих условиях, чрезвычайная ситуация, рулевая машина, левый борт, лопасть винта, роликовый подшипник, водяной радиатор, паровой конденсатор, румпельное отделение, производительность, электрогидравлический привод лопастного типа, охлаждающая система, опрессовка, ваерный барабан, центральный пост управления, монтажная схема, номинальная мощность, вал, нагрузка, опреснительная установка, наддув, средняя часть судна, воздушный шланг, автоматика котла, змеевик теплого ящика, правый борт, наплавка электрической дугой, незначительное несоответствие, давление.

4. Translate sentences from Russian into English:

1. Усилитель – это электронное устройство, которое производит большую мощность, напряжение или ток на выходе, чем на входе.
2. Автотрансформаторы используются для запуска электромоторов, регулирования освещения и т. д.
3. В электродвигателе постоянного тока со смешанным возбуждением есть два типа обмотки: одна обмотка соединена последовательно с якорем, а другая параллельно.

- 
4. Работа электродвигателя постоянного тока основана на принципе электромагнетизма.
 5. Нагревание увеличивает сопротивление цепи и приводит к расширению, трещинам и износу материала.
 6. Предохранители и реле используются для защиты источников электроэнергии, электрической цепи и потребителей от перегрузок и коротких замыканий.
 7. Чтобы изменить направление вращения электродвигателя, необходимо изменить направление тока в якоре или в обмотке.
 8. Конвертер используется для преобразования таких параметров, как напряжение, тип тока, частота судовой электроустановки в требуемые параметры.
 9. Чтобы подготовить электрический мотор к работе, необходимо осмотреть электрический мотор, проверить положение статора, состояние электромагнитных и механических прерывателей и измерить сопротивление изоляции.
 10. Асинхронный электродвигатель переменного тока прост в конструкции, экономичен и надежен в работе.

ВАРИАНТ 2

Перепишите и письменно переведите текст на русский язык.

PROPULSION AUXILIARIES AND PROTECTION

The electric propulsion motor and its shaft bearings, converters, control regulators, transformers, reactor coils and harmonic filters all generate heat that must be continually removed by auxiliary cooling services. An overtemperature condition must be managed by load limitation or disconnection.

High current electrical components are generally cooled by forced air or by forced air/ water circulation. In a large propulsion motor an internal shaft-mounted fan circulates air through the rotor and stator spaces. This air is forced by electric fans to flow through a freshwater cooler, usually mounted on top of the machine, which removes the heat into the main cooling system.

Stator winding, cooling air and water temperatures are monitored for display in the ECR. It is essential that general and hot spot temperature limits are not exceeded.

Large motors and generators have internal electric heaters that are activated when the machine is disconnected. The requirement is to raise the internal temperature to about 3°C above ambient, which will prevent condensation settling on the motor insulation. Typically, an anti-condensation heater rated at about 4 kW at 220 V would be fitted in a large HV machine.

Semiconductor components are particularly sensitive to temperature. In particular, the temperature of large current switching thyristors in the converters must be carefully managed. A perfect closed switch has no voltage drop across it so its power loss is zero when conducting. A thyristor, however, develops a small voltage drop (typically up to 2 V) when conducting its current. For a thyristor carrying an average current of, say, 2000 A, its power loss could be up to 4000 W, which would rapidly destroy the device unless the internal heat is efficiently removed.

The instrument used to measure the conductivity is similar to that used in a salinometer. Conductivity is measured in the units of micro-Siemen (pS) with acceptable values of less than 5 pS for thyristor cooling duty. If the set conductivity limit is exceeded, the test instrument will alarm and trip conditions, depending on the severity of the fault.

Protection of electrical power components requires that they are operated within their normal current, voltage and temperature ratings. A special case arises for the protection of large semiconductors, e.g. thyristors, which can be destroyed by a fast rate of change of voltage and current caused by rapid switching.

To suppress a rapid overvoltage rise (dv/dt) across a thyristor, an R-C snubber circuit is used. Its action is based on the fact that voltage cannot change

instantaneously across a capacitor. The series resistor limits the corresponding current surge through the capacitor while it is limiting the voltage across the thyristor. Significant heat will be produced by the resistor which, in some applications, is directly cooled by a water jacket.

An in-line inductive effect will limit the rate of change of current (di/dt) through the thyristor. Special fast-acting line fuses may be used as backup over-current protection for the thyristors.

Circuit protection for the electric propulsion units (including excitation and harmonic filters) principally employs coordinated protective relays that monitor current, voltage, earth leakage and temperature.

The settings of relay parameter level (overcurrent, undervoltage, etc.) and their tripping times are critical to the circuit protection under fault conditions. Such settings have been very carefully matched to the circuit and its components. Confirmation testing of protective relays requires calibrated current and voltage injection, which is generally regarded as a specialist task for an outside contractor. Testing is normally performed during a major survey during a dry-docking period.

1. Answer the following questions:

1. What equipment generates heat that must be continually removed by auxiliary cooling services?
2. How can an overtemperature condition be managed by?
3. What is the way to cool high current electrical components?
4. Why is it necessary for large motors and generators to have internal electric heaters?
5. What units is conductivity measured in?
6. What happens if the set conductivity limit is exceeded?
7. What is used to suppress a rapid overvoltage rise across a thyristor?
8. Describe the circuit protection for the electric propulsion units.
9. What parameters are critical to the circuit protection?
10. When is testing of protective relays usually performed?

2. Translate the dialog.

A: I see that cargo winches are not yet mounted. Why so?

B: Лебедки уже на борту и будут установлены, как только мы получим электрическую схему подключения.

A: OK. Are the auxiliary diesel generators in a serviceable condition?

B: Да, конечно. Главный распределительный щит уже установлен и генераторы уже питают энергией потребителей.

A: Glad to hear it. Now, I am going to introduce you our foreman who is responsible for mounting and adjusting all machinery and systems in the engine room.

В: Отлично. Давайте пройдем в машинное отделение.

А: Follow me, please.

3. Translate words from Russian into English:

Траловая лебедка, подключение, субподрядчик, надежный, рулевой привод, увеличение температуры масла, поршневой насос, жаловаться, автоматическая пусковая система, цилиндровая крышка, полный вперед, подшипник скольжения, осеально-плунжерный насос, сборка и настройка, охлаждающие насосы, окончательная сборка, электросварка, полный назад, защита главного двигателя, гидравлический насос, перо руля, отработавший пар, система ручного управления, винт регулируемого шага, мощность генератора, частота вращения, шлифовка, пресная вода, подача топлива, баллер руля.

4. Translate sentences from Russian into English:

1. Работа всех трансформаторов основана на принципах взаимной индукции.
2. Грязь, дым, жир является причиной неправильной работы электрического устройства или поломки.
3. Трансформаторы используются для увеличения или уменьшения напряжения переменного тока в цепи.
4. Система сельсин – это синхронная передающая система. Это основа для оборудования, которое контролирует рулевой механизм, работу котла, скорость и направление движения судна.
5. Вращающаяся часть генератора называется ротор, а неподвижная часть – статор.
6. Электричество доставляется до потребителей с помощью судовой электрической цепи.
7. Противодвижущая сила генерируется в электродвигателе постоянного тока, когда катушки якоря пересекают электромагнитное поле.
8. Генератор переменного тока обычно оснащен маленьким вспомогательным генератором, называемым возбудителем.
9. Электромеханик всегда должен проверять готовность и работу электрооборудования, наблюдать за запуском и отключением генераторов и электромоторов.
10. Соединение в трехфазном генераторе переменного тока может быть соединением треугольником или звездочкой.

ВАРИАНТ 3

Перепишите и письменно переведите текст на русский язык.

REFRIGERATION AND AIR CONDITIONING

Whatever the size or role of the ship's refrigerators, the basic principle is common to them all. Each will have an evaporator (cooling unit), a refrigerant compressor and a condenser.

The refrigerant used is generally Freon-R417 (reefer container units use R-134a, R404 or other types of refrigerant), which is classified as almost harmless to the ozone layer if it escapes into the atmosphere. Freon refrigerants in general use are colourless, non-toxic, non-corrosive and non-flammable. However, when exposed to an open flame they produce toxic gases that are severe respiratory irritants capable of causing death. Additional components to the basic refrigerant cycle may include filter driers, heat exchangers, accumulators and pre-coolers. Also required are the operating and protective controls, such as thermostats, relays, defrost controls and overcurrent trips. For units bigger than a domestic-sized refrigerator, the compressor motor will invariably be a three-phase type driving a reciprocating compressor.

The rooms or compartments are cooled by natural air circulation through the evaporator coils or by forced air from a fan blowing across a bank of cooling tubes. The main temperature control device in the refrigerator is the thermostat which senses the evaporator temperature via a capillary tube. The set temperature is adjusted by a control knob that tensions the control spring against the pressure of the bellows. For motor protection, a bimetallic OCR trip is included as part of the control relay alongside the compressor. The motor supply current either passes directly through a bimetal strip or disc or the bimetal is heated indirectly from a small resistance heater alongside it. A motor overcurrent will cause the bimetal to deflect and cause a snap action switch to open.

When the evaporator temperature rises, the thermostat switch closes, allowing current to flow through the motor run winding and the relay solenoid coil. This current is initially high, causing the solenoid to close the relay switch to allow current into the start winding.

The motor will now begin to accelerate from standstill, causing its run winding current to reduce to a level where the start-relay will drop off. The motor will now run continuously on the run-phase only. When the evaporator reaches its set temperature, the thermostat resets and the motor is switched off.

The most common way to achieve automatic defrosting of the evaporator is to use a time switch to cut out the refrigeration circuit and initiate a defrost heater circuit. The timer is generally an electronic relay with a set of changeover contacts. A bimetallic defrost thermostat controls the defrost heater in or below the evaporator.

Some refrigerators and freezers may have electric heaters fitted for various duties such as a dewpoint heater (to prevent sweating on the cabinet in the freezer area) and a compartment divider panel or stile heater (to prevent sweating on the panel). Additionally there may be condenser and evaporator fans that are driven by single-phase, shaded-pole type motors.

Air Conditioning

Air conditioning is a process that heats, cools, cleans and circulates air and controls its moisture content. The air must be delivered with a definite temperature and specified relative humidity.

The electrical aspects of accommodation air conditioning comprises the power equipment of motors and starters for the compressors, fans and seawater cooling pumps. Associated control equipment will include electric solenoid valves, high and low pressure and temperature switches, together with safety cutouts for overcurrent, loss of refrigerant, low compressor oil pressure, etc.

The usual air conditioning system used for the accommodation spaces of cargo ships is the central single duct type. In its simplest form, a single compressor serves the whole accommodation. The compressor is generally a multi-cylinder reciprocating type with a power rating in the range of 20-100 kW. Large passenger vessels may have a total power requirement of more than 5 MW for the AC compressor drives to maintain air delivery to the hotel and staff accommodation areas. Capacity control of the reciprocating compressor is by automatic unloading of cylinders by valve control using servo oil pressure.

The compressor, air fan and seawater pump are driven by simple fixed-speed, three-phase AC induction motors, each with its own starter and supplied from a distribution board fitted in the air conditioning plant room.

Inspection of connections and correct operation of any electric equipment must be performed in accordance with the manufacturer's instructions.

1. Answer the following questions:

1. What are basic units of ship's refrigerators?
2. Why is Freon-R417 used as a refrigerant onboard?
3. What properties of freon refrigerants do you know?
4. What type of compressor motor is used for units bigger than a domestic-sized refrigerator?
5. What is the main temperature control device in the refrigerator?
6. What will a motor overcurrent cause?
7. What is the most common way to achieve automatic defrosting of the evaporator ?
8. What is the function of electric heaters fitted on some refrigerators?
9. What is the function of air conditioning?
10. Describe the electrical aspects of air conditioning.

2. Translate the dialog.

A: Now here you can see the ship's emergency diesel generator.

B: В какой стране произведен этот генератор?

A: This diesel generator is made in Great Britain.

B: Какая мощность у этого генератора?

A: 175 kW.

B: О, неплохо. А какой тип охлаждающей системы?

A: The water radiator type. But the radiator is empty now.

B: Я надеюсь, вы его уже запустили?

A: We checked its automatic starting system.

3. Translate words from Russian into English:

Полный назад, защита главного двигателя, гидравлический насос, перо руля, отработавший пар, система ручного управления, винт регулируемого шага, частота вращения, шлифовка, пресная вода, подача топлива, баллер руля, вспомогательный дизель-генератор, кабель, радиально-плунжерный насос, вращение, питать энергией потребителей, турбокомпрессор, подача воздуха, главный распределительный щит, уровень воды, электрическая схема, система пускового воздуха, грузовая лебедка.

4. Translate sentences from Russian into English:

1. Судовая электрическая цепь включает в себя электрические кабели, провода, распределительные щиты.
2. Первичная катушка – это входная катушка трансформатора, а вторая – это выходная катушка.
3. Судовые электроустановки классифицируются согласно их функции, типу первичного двигателя и типу управления.
4. Трансформатор состоит из двух катушек обмотки на одном сердечнике.
5. До запуска дизельного генератора проверьте количество смазывающего масла в танке и открывание топливных клапанов.
6. Генератор постоянного тока с независимым возбуждением используется для управления рулевого механизма, лебедок.
7. Изоляция морских кабелей обычно имеет 700 вольт постоянного тока и 1 000 вольт переменного тока.
8. Судовая электроустановка может использовать постоянный или переменный ток.
9. Влажность приводит к короткому замыканию.
10. Осмотр машин постоянного и переменного тока обычно производится в ремонтных мастерских судоремонтных заводов.

6. ТРЕБОВАНИЯ К ЗАЧЕТАМ И ЭКЗАМЕНАМ

І курс

Сессия 1/1 экзамен, сессия 1/1 зачет с оценкой (уск)

1. Выполненная и зачтенная контрольная работа.
2. Тетрадь с выполненными упражнениями.
3. Составленный словарь.
4. Чтение и перевод текстов, проработанных по учебнику Китаевича Б.Е. Беседа по содержанию текстов.
5. Монологические высказывания по темам:
 - About Myself
 - Seasons and weather
 - Marine Academy
 - The Ship's Crew

Сессия 1/2 зачет

1. Выполненная и зачтенная контрольная работа.
2. Тетрадь с выполненными упражнениями.
3. Составленный словарь.
4. Чтение и перевод текстов, проработанных по учебнику Китаевича Б.Е. Беседа по содержанию текстов.
5. Монологические высказывания по темам:
 - Shipboard training
 - Our Country
 - Types of Ships
 - The discovery of the Antarctic

ІІ курс

Сессия 2/1 зачет с оценкой

1. Выполненная и зачтенная контрольная работа.
2. Тетрадь с выполненными упражнениями.
3. Составленный словарь.
4. Чтение и перевод текстов по специальности. Беседа по содержанию текстов учебника Рубцовой И.А., Гогиной Н.А.:
 - General description of a ship
 - The hull
 - Types of merchant ships
 - Keeping underway watches

Сессия 2/2 зачет, сессия 1/2 зачет (уск)

1. Выполненная и зачетная контрольная работа.
2. Тетрадь с выполненными упражнениями.
3. Составленный словарь.
4. Чтение и перевод текстов по специальности. Беседа по содержанию текстов учебника Рубцовой И.А., Гогиной Н.А.; Потаповой Л.Н., Ботяновской С.П.:
 - Actions during accident on board
 - Marine environmental pollution
 - Basic construction of a diesel engine
5. Чтение и перевод стандартных фраз ИМО (IMO Standard Marine Communication phrases)

III курс

Сессия 3/1 зачет, сессия 2/1 зачет (уск)

1. Выполненная и зачетная контрольная работа.
2. Тетрадь с выполненными упражнениями.
3. Составленный словарь.
4. Чтение и перевод текстов по специальности. Беседа по содержанию текстов учебника Ступиной Л.Г., Усольцевой Г.М.:
 - Electricity
 - DC generators
 - AC generators
 - DC motors

Сессия 3/2 зачет с оценкой, сессия 2/2 зачет с оценкой (уск)

1. Выполненная и зачетная контрольная работа.
2. Тетрадь с выполненными упражнениями.
3. Составленный словарь.
4. Чтение и перевод текстов по специальности. Беседа по содержанию текстов учебника Ступиной Л.Г., Усольцевой Г.М.:
 - AC motors
 - Ship's power plant and auxiliary electrical equipment
 - Maintenance and troubleshooting
 - Diesel engine
 - Engine-room department
 - Conventions

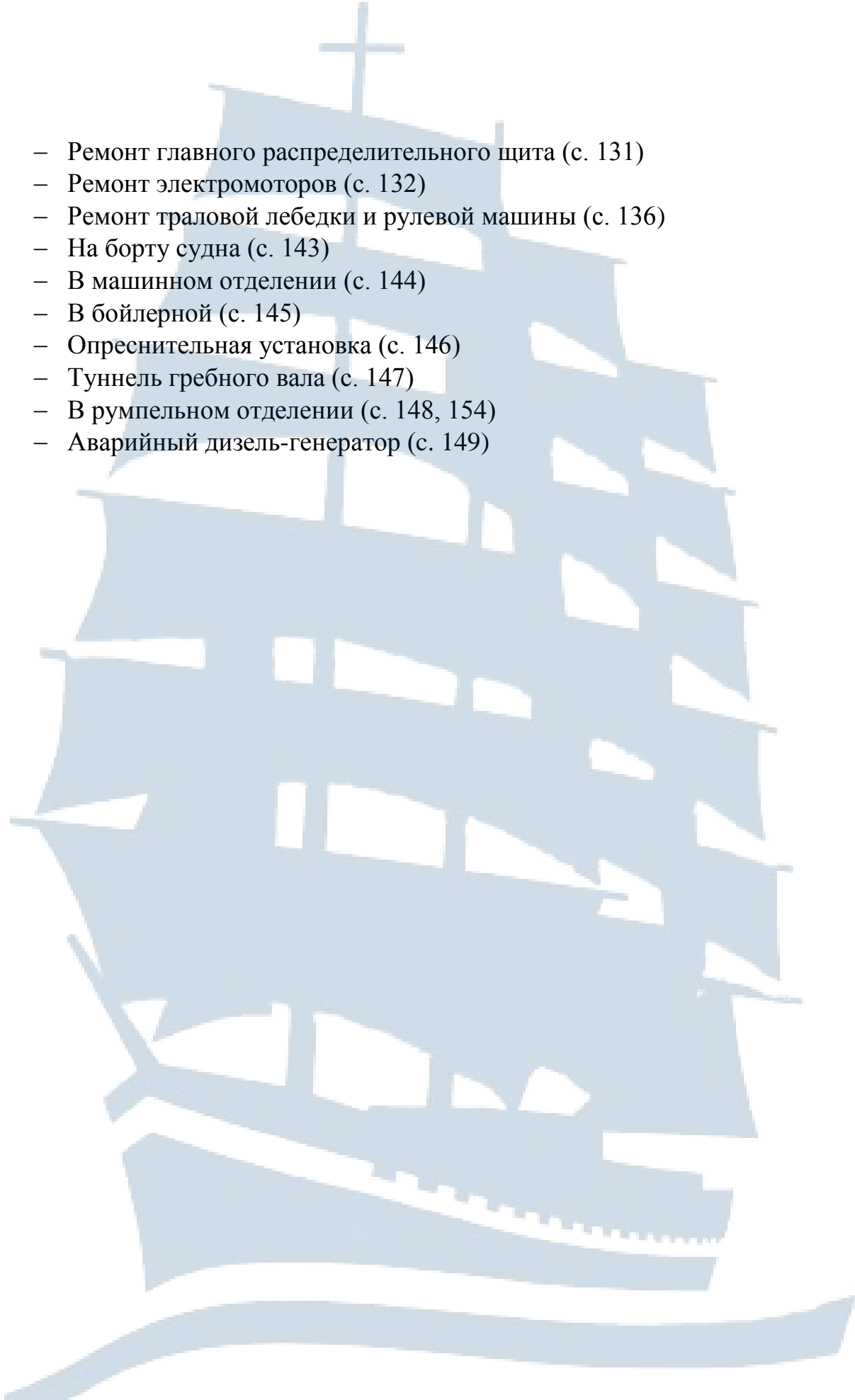
IV курс

Сессия 4/1 зачет с оценкой, сессия 3/1 зачет с оценкой (уск)

1. Выполненная и зачетная контрольная работа.
2. Тетрадь с выполненными упражнениями.
3. Составленный словарь.
4. Чтение и перевод текстов по специальности. Беседа по содержанию текстов учебника Ступиной Л.Г., Ковтун Л.Н.:
 - Power Distribution system.
 - Emergency Power supply.
 - Insulated and earthed neutral system.
 - Significance of Earth faults.
5. Чтение и перевод диалогов из учебника Пениной И.П., Емельяновой И.С.:
 - Предварительное обсуждение ремонтной ведомости (с. 118-119)
 - Общая информация относительно капремонта главного двигателя и крышек цилиндров (с.123-124)
 - Ремонт парового котла (с.129)
 - Ремонт главного распределительного щита (с. 131)
 - Ремонт щита питания с берега (с. 132)
 - Ремонт электромоторов (с. 132)
 - Ремонт электрооборудования на камбузе. Лампы (с. 133)

Сессия 4/2 экзамен, сессия 3/2 экзамен (уск)

1. Выполненная и зачетная контрольная работа.
2. Тетрадь с выполненными упражнениями.
3. Составленный словарь.
4. Чтение и перевод текстов по специальности. Монологическое высказывание по темам:
 - 1) Duties of electrical engineer / Профессия судового электромеханика
 - 2) Power Distribution System / Электрическая распределительная система судна
 - 3) DC and AC Generators / Генераторы постоянного и переменного тока
 - 4) DC and AC Motors / Электромоторы постоянного и переменного тока
 - 5) Diesel Engine / Дизельный двигатель
 - 6) Transformers and auxiliary electrical equipment / Трансформаторы и вспомогательное оборудование
 - 7) Safety at Sea / Безопасность работы в море
5. Чтение и перевод диалогов из учебника Пениной И.П., Емельяновой И.С.:
 - Общая информация относительно капремонта главного двигателя и крышек цилиндров (с.123-124)

- 
- Ремонт главного распределительного щита (с. 131)
 - Ремонт электромоторов (с. 132)
 - Ремонт траловой лебедки и рулевой машины (с. 136)
 - На борту судна (с. 143)
 - В машинном отделении (с. 144)
 - В бойлерной (с. 145)
 - Опреснительная установка (с. 146)
 - Туннель гребного вала (с. 147)
 - В румпельном отделении (с. 148, 154)
 - Аварийный дизель-генератор (с. 149)

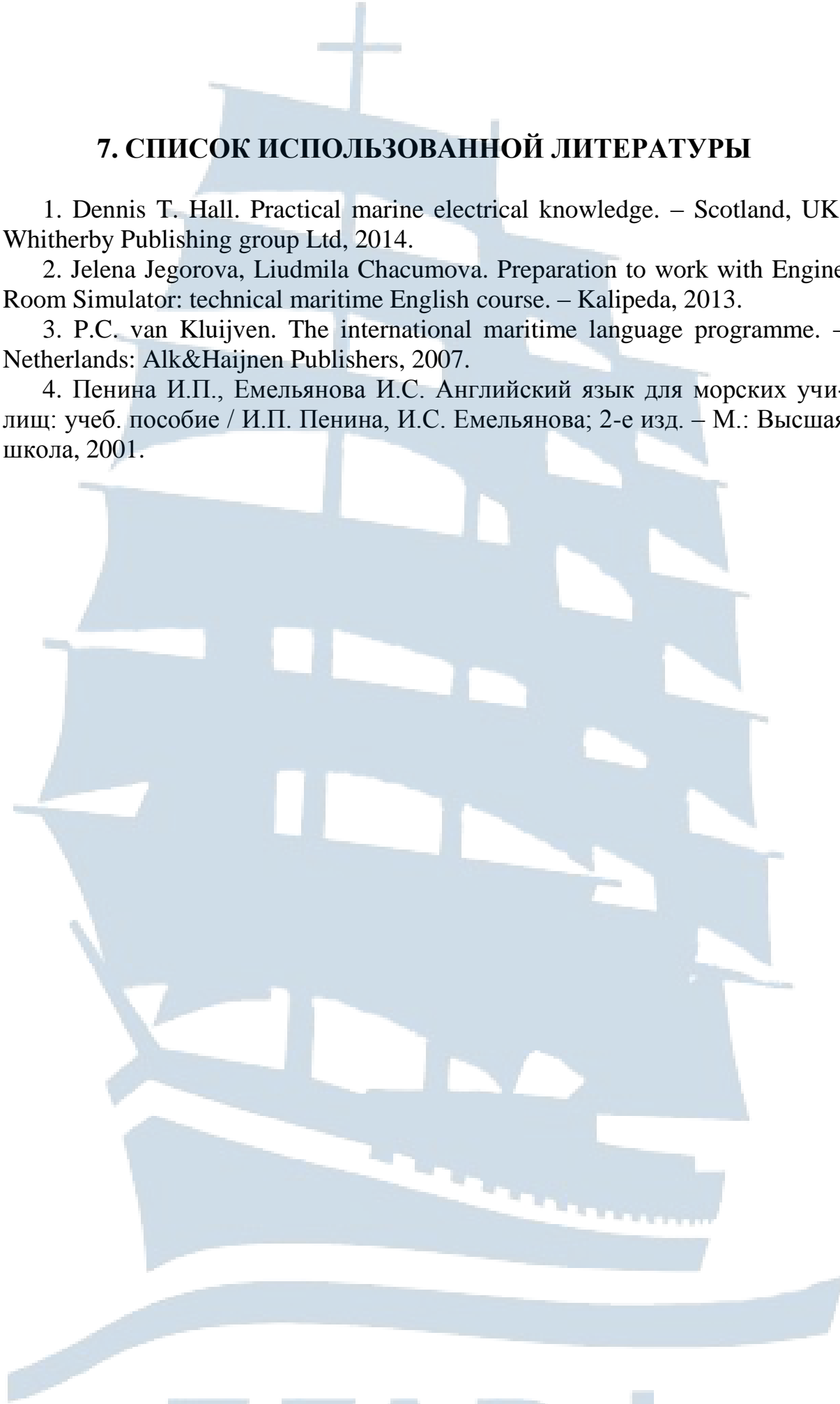
7. СПИСОК ИСПОЛЬЗОВАННОЙ ЛИТЕРАТУРЫ


1. Dennis T. Hall. Practical marine electrical knowledge. – Scotland, UK: Whitherby Publishing group Ltd, 2014.

2. Jelena Jegorova, Liudmila Chacumova. Preparation to work with Engine Room Simulator: technical maritime English course. – Kalipeda, 2013.

3. P.C. van Kluijven. The international maritime language programme. – Netherlands: Alk&Hajnen Publishers, 2007.

4. Пенина И.П., Емельянова И.С. Английский язык для морских училищ: учеб. пособие / И.П. Пенина, И.С. Емельянова; 2-е изд. – М.: Высшая школа, 2001.





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