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**МИНИСТЕРСТВО НАУКИ И ВЫСШЕГО ОБРАЗОВАНИЯ РОССИЙСКОЙ ФЕДЕРАЦИИ
ГРОЗНЕНСКИЙ ГОСУДАРСТВЕННЫЙ НЕФТЯНОЙ ТЕХНИЧЕСКИЙ УНИВЕРСИТЕТ
имени акад. М.Д. Миллионщикова**

Межфакультетская языковая кафедра

«УТВЕРЖДЕН»

на заседании Межфакультетской языковой кафедры

« 01 » _____ 2021 г.,
Зав. кафедрой  Т.З. Магомадова

ФОНД ОЦЕНОЧНЫХ СРЕДСТВ

по учебной дисциплине

Иностранный язык

Специальность

21.05.01 Прикладная геодезия

Специализация

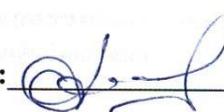
«Инженерная геодезия»

Год начала подготовки

2021

Квалификация

Инженер-геодезист

Составитель:  _____ доцент, к.п.н. / Акаева Х.А./

ФОНД ОЦЕНОЧНЫХ СРЕДСТВ ПО УЧЕБНОЙ ДИСЦИПЛИНЕ
Иностранный язык
(наименование дисциплины)

№ п/п	Контролируемые разделы (темы) дисциплины	Код контролируемой компетенции (или ее части)	Наименование оценочного средства
1.	Phonetic course. Text for reading. GEODESY	УК-4	<i>Чтение текста</i>
2.	Phonetic course. Text for reading HISTORY OF SURVEYING	УК-4	<i>Лексико-грамматические упражнения</i>
3.	Basic grammar course. Text for reading. THE SIMPLEST FORM OF HORIZONTAL CONTROL	УК-4	<i>Контрольная работа</i>
4.	Acquaintance. Text for reading MODERN SURVEYING GLOBAL POSITIONING	УК-4	<i>Работа с текстом</i>
5.	Acquaintance. Text for reading. MODERN SURVEYING ESTABLISHING THE FRAMEWORK	УК-4	<i>Составление сообщений по теме</i>
6.	Education. Text for reading. MODERN SURVEYING THE THEODOLITE	УК-4	<i>Лексико-грамматические упражнения. Тексты</i>
7.	Basic grammar course. Text for reading. MODERN SURVEYING TOTAL STATION	УК-4	<i>Контрольная работа</i>
8.	Welcome. Text for reading. MODERN SURVEYING DETAIL SURVEYING	УК-4	<i>Доклад/презентация</i>
9.	Cities like people. Text for reading. MODERN SURVEYING AERIAL SURVEYING	УК-4	<i>Тексты</i>
10.	Basic grammar course. Text for reading. MODERN SURVEYING HYDROGRAPHY	УК-4	<i>Тексты профессиональной направленности</i>
11.	The Industry of Great Britain. Text for reading. MODERN SURVEYING HEIGHT DETERMINATION	УК-4	<i>Доклад/презентация</i>

12.	Basic grammar course. Text for reading. 3D LASER SCANNING FOR CULTURAL HERITAGE	УК-4	<i>Тексты профессиональной направленности</i>
13.	The celebrations. Text for reading. TOOLS AND PRODUCTS OF MODERN GEODESY	УК-4	<i>Тексты профессиональной направленности Составление рефератов</i>

ПЕРЕЧЕНЬ ОЦЕНОЧНЫХ СРЕДСТВ

№ п/п	Наименование оценочного средства	Краткая характеристика оценочного средства	Представление оценочного средства в фонде
1.	<i>Работа с текстом</i>	Чтение текста по специальности на понимание (извлекая из него необходимую информацию); чтение текста по специальности с переводом, используя словарь; выписка ключевых слов и предложений, выражающих главную идею текста из каждого абзаца; пересказ текста, используя ключевые слова и предложения; вопросы к тексту и ответы на них. Контроль знаний студентов по пройденному материалу.	Тексты по специальности
2.	<i>Тесты</i>		
3.	<i>Контрольная работа</i>	Средство проверки умений применять полученные знания для выполнения заданий определенного типа по теме или разделу учебной дисциплины.	Комплект контрольных заданий по вариантам
4.	<i>реферат</i>	Продукт самостоятельной работы студента, представляющий собой публичное выступление по решению определенной учебно- практической, учебно-исследовательской или научной темы	Темы рефератов

КОМПЛЕКТ ЗАДАНИЙ ДЛЯ КОНТРОЛЬНОЙ РАБОТЫ

I семестр:

I – рубежная аттестация

Грамматика: Фонетика, порядок слов в предложении, числительные, глагол to be, to have, местоимения, существительное, притяжательный падеж. Типы вопросов (общий, альтернативный, специальный и разделительный).

Тема: «Acquaintance» I Аттестационная работа (1 курс, 1 семестр)

Вариант № 1

Задание № 1. Дайте транскрипцию следующих слов.

Match, cap, page, Jane, give style, vet, bay, sat, tilt, file, faint, ease, pet, tin, veal, slip, stay, neck, mice, race, kin, gate, gem, gas, , egg, gin, game, beg, , ship, shape, shave, Fish, shine, chest, chin, match, chill, this, these, than, them, theme. Faith, thick, read, rest, rally, hand, hay, heap, help, easy, daddy, yet, yelp, exam, sex, six, gang, sling.

Задание № 2. Письменно переведите следующие предложения. 1. There are no modern conveniences in their house. 2. There is water in the bottle. 3. В этом здании 12 инженеров. 4. В этой науке три фактора.

Задание № 3. Выберите **прилагательное** в соответствующей степени сравнения и переведите предложения.

1. Sweden is the fifth (large, larger, largest) country in Europe.
2. In the past we needed (little, less, the least) mathematics than today.
3. You look much (good, better, the best) today.
4. Who is that boy in the (far, further, furthest) corner of the room?

Задание № 4. Выберите нужную форму глагола **to be**. Перепишите и переведите предложения на русский язык.

1. Her hair (is, are, am) long, black and beautiful.
2. We (is, are, am) at the Zoo .
3. They ((is, are, am) busy now.
4. I think the audience (is, are, am) good .

Задание № 5. Поставить следующие предложения во множественное число.

1. A new house is in our street.
2. This story is very interesting.
3. There was a woman, a man, a boy and a girl in the room.
4. In the farm-yard we could see an ox, a sheep, a cow and a goose.

Задание № 6. Напишите транскрипции следующих слов: receive, submit, lender, client, liability, appear, final.

Задание № 7. Прочитать и перевести абзац текста.

Задание № 8. Ответить на вопросы. 1) Are you a student?

- 2) Where do you live?
- 3) What is your address?
- 4) What's your phone number?

Задание № 9. Переведите следующие выражения с технического текста (устно): любой инженер, здание не может рассматриваться, с самого начала, выживание, историческое наследие, во всех фазах, ценность культурного наследия.

Переведите на английский язык. Анна, идите, пожалуйста, к доске. Прочитайте, пожалуйста, текст. Найдите, пожалуйста, примечание седьмое. Прочитайте его, пожалуйста. Дайте Джейн те карандаши, пожалуйста. Эта девушка — моя сестра. Ее зовут Мэри. Она инженер. Ваш сын инженер или рабочий? — Он рабочий. Кто ваша подруга? — Она повар. Петр — врач. Он мой друг. Он хороший врач и хороший друг. Фред — студент. Сейчас он в своей комнате. Ваши студенты в той комнате? Ваш друг врач или преподаватель? — Он врач.

Задание № 10. Расскажите устную тему.

I Аттестационная работа (1 курс, 1 семестр)
Вариант № 2

Задание № 1. Дайте транскрипцию следующих слов.

Kin, keen, pact, face, gate, gem, gas, age, Jim, Jack, sky, shame, shave, Fish, shine, , Fetch, chick, theme, cap, ice, came, nice, cat, bird, third, stern, turn, Byrd, furs, curl, curt, serf, curb, herb; want, wash, wheat, ward, whether, which, whiff, whip, warn, whole, warp, why, chest, sister, frost, lick, sly, pace, lunch, rib, chill, sky, hale, rose, spine, till, spider, vine, till, sniff, maze, pan, reader.

Задание № 2. Письменно переведите предложения.

1. There is a creative imagination in the design.
2. There are all phases of development in the human history.
3. Творческое воображение в архитектуре.
4. В культурном наследии удобство, сила и красота.

Задание № 3. Выберите **прилагательное** в соответствующей степени сравнения и переведите предложения.

1. He found the work (easy, easier, the easiest) than he had expected.
2. She was (active, more active, the most active) of us.
3. He felt (bad, worse, the worst) yesterday than the day before.
4. When he had left Paris it was as (cold, colder, the coldest) as in winter there.

Задание № 4. Выберите нужную форму глагола **to be**. Перепишите и переведите предложения на русский язык.

1. She (is, are, am) at the lecture now.
2. Last winter (is, are, am) cold.
3. We ((is, are, am) free now.
4. I ((is, are, am) at home now.

Задание № 5. Поставить следующие предложения во множественное число. 1. Put this knife on that table. 2. Why don't you eat this potato? 3. This strawberry is still green. 4. A yellow leaf has fallen to the ground.

Задание № 6. Напишите транскрипции следующих слов: philosopher, theory, design, sufficient, knowledge, background, historians.

Задание № 7. Прочитать и перевести абзац текста.

Задание № 8. Ответить на вопросы. 1) What colour hair have you got?

2) What colour eyes have you got? 3) Do you know all of your uncles? How many of them have you seen? Who are the new ones? When did you last see them? When will you get a chance to see all these relatives again?

Your Dad's and Mum's Job

Задание № 9. Переведите следующие выражения с технического текста (устно): мастерство, прошлое нельзя игнорировать, означать, непрерывность, современная терминология.

Переведите на английский язык. Катя моя подруга. — Кто она (по профессии)? — Она преподавательница. Где ваш преподаватель? — Он здесь. Моя сестра. Не посылайте Кате те книги. Пошлите Кате эти новые книги, пожалуйста. Встретьте этих инженеров здесь, пожалуйста.

Пожалуйста, возьмите чашки со стола. Поставьте, пожалуйста, чашки на этот стол. Спасибо. Пожалуйста, положите эту книгу в свой портфель. Возьмите, пожалуйста, ложку у этого мальчика.

Задание № 10. Расскажите устную тему .

Аттестационная работа (1 курс, 1 семестр)
Вариант № 3

Задание № 1. Дайте транскрипцию следующих слов.

Torn, corn, gorge, cork, or, for, term, first, bird, third, stern, turn, Byrd, furs, curl, curt, serf, curb, herb; want, wash, was, watch, watt; whale, wharf, wheat, ward, when, whether, which, whiff, whip, warn, whole, warp, why, cat, bunch, pinch, rice, will, chest, sister, frost, lick, sly, pace, lunch, rib, luck, cry, chat, shy, chill, sky, hale, rose, spine, till, spider.

Задание № 2. Письменно переведите предложения .

1. There are different customs in this country .
- 2 There is a competition in this public service .
3. Структурные принципы в строительстве зданий.
4. Достаточные знания инженерии в истории о строительстве

Задание № 3. Выберите **прилагательное** в соответствующей степени сравнения и переведите их.

1. Love is (precious, more precious, the most precious) than money.
2. To violate traffic regulations is very (dangerous, more dangerous, the most dangerous).
3. Interrupting people is (bad, worse, the worst) of all.
4. The House of Lords is (large, larger, the largest) in membership but the House of Commons has nearly all the power.

Задание № 4. Выберите нужную форму глагола **to be**. Перепишите и переведите предложения на русский язык.

1. The weather promised to be fine. There ((is, are, am)) many stars in the sky.
2. Buckingham palace ((is, are, am)) the place where presidents, kings and politicians go to meet the Queen.
3. The commercial program on TV (is, are, am) of little artistic value.
4. Competition (are, is, am) a good stimulus in the young managers' future work.

Задание № 5. Поставить следующие предложения во множественное число.

1. An expensive furniture is in this apartment.
2. This lady is very talkative.
3. There was a saleswoman, a sportsman, a boy and a girl in the store.
4. In the yard we can see an ox, a pig, a cow and a goose.

Задание № 6. Напишите транскрипции следующих слов: creative, science, consider, survive, style, basic, guide.

Задание № 7. Прочитать и перевести абзац текста.

Задание № 8. Ответить на вопросы. 1) Where does your mother work?

2) Does she work in a factory? In an office? On a farm?

In a garage?

4) Does your Mum work at home?

Задание № 9. Переведите следующие выражения с технического текста (устно): письменная архитектура, она также стара как и письмо, много книг, по теории архитектуры, эстетическая внешность здания, старейшая книга, искусство строительства, всегда взаимодействуют.

Переведите на английский язык. Пишите слова и вопросы в своих тетрадях и не смотрите на доску, пожалуйста. Закройте свои книги и откройте тетради, пожалуйста. Не закрывайте

свои книги. Читайте восьмой текст, пожалуйста. Не кладите свою сумку на стол, пожалуйста, положите ее на этот стул. Не списывайте третий текст, спишите четвертый текст, пожалуйста. Садитесь, пожалуйста. Не ходите туда, пожалуйста. Не делайте этого, пожалуйста. Не пишите этих слов сейчас, пожалуйста, сделайте это дома.

Задание № 10. Расскажите устную тему .

I Аттестационная работа (1 курс,1 семестр)

Вариант № 4

Задание № 1. Дайте транскрипцию следующих слов.

Chin, match, thin cap, can, ice, peck, pace, kin, keen, pact, face, gate, gem, gas, age, gym, page, egg, game, shame, dish, she, ship, shape, shave, Fish, shine, chest, chin, match, catch,, hide, yes, yell, easy, daddy, yet, yelp, my, by, myth, next, cell, cod, sing, spin, term, bird, third, stern, turn, wheat, ward, when, whether, which, whiff, whip, warn, whole, warp, why, cat, bunch, pinch, rice, will, chest, sister, frost, lick, sly, pace, lunch, cot, tone, cope, dot, sock, hot, rope, doll, hop, bone.

Задание № 2. Письменно переведите следующие предложения.

1. There is smoke in the room.
2. There are famous tombs in Scotland?
3. В строительстве существует гармония.
4. Промышленная революция в дизайне.

Задание № 3. Выберите **прилагательное** в соответствующей степени сравнения и переведите предложения.

1. He is the (old, oldest, eldest) son of my father's friend.
2. What is the (much, more, most) important invention in the twentieth century?
3. We have heard the (late, later, latest) news on the radio.
4. I am sure this coffee tastes (good, better, the best) than that one.

Задание № 4. Выберите нужную форму глагола **to be**. Перепишите и переведите предложения на русский язык.

1. The news he told us ((is, are, am)) interesting.
2. The Metric System ((is, are, am) a system of measures and weight.
3. You (is, are, am) at home ?
4. It (is, are, am) cold week?

№ 5. Поставить следующие предложения во множественное число.

1. That is a stove in the kitchen.
2. Put that knife on this table.
3. What is your name?
4. This foot is large .

Задание № 6. Напишите транскрипции следующих слов: coexistence, recognition, almost, roman, terminology, strength, which.

Задание № 7. Прочитать и перевести абзац текста.

Задание № 8. Ответить на вопросы. Is Lena a sunny soul by nature? What makes you think so?

2. Has she an imagination? Prove it. 4) Do you know all of your aunts? How many of them have you seen? When did you last see them? When will you get a chance to see all these relatives again?

Задание № 9 Переведите следующие выражения с технического текста (устно): написанная, в 1 веке до нашей эры, почти 2000 лет назад, римский архитектор Маркус Витривиус Полио, установить нормы, по которым, должны быть креативными.

Переведите на английский язык. Пишите слова и вопросы в своих тетрадях и не смотрите на доску, пожалуйста. Закройте свои книги и откройте тетради, пожалуйста. Не закрывайте

свои книги. Читайте восьмой текст, пожалуйста. сейчас в Минске-. Моя подруга тоже там. Петр и Анна в Киеве? — Да, в Киеве, они навешают своих друзей.— Их. сын тоже в Киеве? — Нет, он сейчас здесь.— Что он делает? 7. Кто этот мальчик? — Он мой сын. Кто эта девушка? — Она инженер.

Задание № 10. Расскажите устную тему .

Контрольная работа №1 (1 курс, 1 семестр)

Задания:

- 1) Напишите транскрипцию следующих слов:
Best, east, such, hue, tide, sit, grain, bake, fly, hole.
- 2) Вставьте артикль, где необходимо.
 1. This is ... file. It's your ... file.
 2. I see ... engineer. ... engineer is very clever.
 3. We study ... English.
 4. What ... interesting subject!
 5. ... Grozny is ... capital of ... Chechen Republic.
- 3) Напишите следующие существительные во множественном числе:
A tree, a baby, a day, a sheep, a leaf, a tooth, a watch, a glass, a word, a brush.
- 4). Поставьте следующие предложения во множественном числе:
 1. It is a long ruler.
 2. This compass is very good.
 3. That is a clean blackboard.
 4. There is a computer on the table.
 5. Is that story short?
- 5) Перефразируйте следующие словосочетания и предложения, употребляя притяжательный падеж.
 1. A test of Ann.
 2. A copy-book of my friend.
 3. The pages of the book.
 4. The tests of the students are on the shelf.
 5. These are the bags of Ted.
- 6). Вставьте глаголы **to be** и **to have** в Present Indefinite Tense.
 1. I ... a student. – I ... a student of the college.
 2. My father ... not a teacher, he ... a scientist.
 3. ... your parents at home? – No, they ... not at home, they ... at work.
 4. How old ... you? – I ... twenty.
 5. We ... a friend. He ... a lot of English books.
- 7) Задайте 4 типа вопросов к следующим предложениям.
 1. A computer is on the table.
 2. The students have two lectures on Monday.
- 8) Переведите на английский язык следующие предложения.
 1. Это ваш учебник? – Нет, это учебник нашего преподавателя.
 2. Чья это ручка? – Это ручка Бена.
 3. Где ваша сестра? – Она в институте.

4. Как зовут вашего друга? – Его зовут Майк.

5. Сколько лет твоей маме? – Ей 42 года.

9. Поставьте следующие предложения в отрицательную и вопросительную формы:

1. This room is large and clean. 2. Minsk is a fine city. 3. He is reading a book now. 4. We are writing the English sentence. 5. I am at the blackboard. 6. The walls in my room are yellow.

10. Заполните пропуски притяжательными местоимениями:

.Open...books, please. 2. Sit down, Peter. ... mark is good. 3. Is she a teacher? Are these and girls ... pupils? 4. This man is engineer.... name's Petrov. 5. We're students. This is ... boys classroom. Thedoorin... classroomislight.

II – рубежная аттестация

2 Аттестационная работа (1 курс, 1 семестр)

Вариант № 1

Задание № 1. Письменно переведите следующие предложения.

1. Могу я задать вам вопрос?

2. Я не мог позвонить ему до 9 часов.

3. Погода прекрасная. Тебе не нужно брать зонт.

4. Нам следует быть к нему внимательнее.

Задание № 2. Поставить глаголы в Pr. Ind., Pr. Cont., Past Ind.,

1. Boris (to write) a letter?

2. It (to be) raining .

3. The wind (to blow) from the west?

4. She (stand) in the middle of the street.

Задание № 3. Задать 4 типа вопроса.

1. I (like) to stay with my granny very much?

2. She (watch) her favourite program.

3. Why people (wear) raincoats and (carry) big umbrellas?

4. I (hope) (watch) a big fight now.

Задание № 4. Поставить предл. в вопросительную и отрицательные формы.

1. In summer many relatives (come) to visit us.

2. Now they (use) achance to spend several weeks in beautiful Sochi.

3. Some months later I (finish) school № 5 in Sochi. I did well in all the subjects but my favourite subjects at school were Physics and Computer Science.

Задание № 5. Напишите транскрипции следующих слов: science, license, regulation, official, detailed, specify.

Задание № 6. Прочитать и перевести абзац текста.

Задание № 7. Ответить на вопросы. 1. Did you decide to be an architect?

2. Are you sure in the choice of your future job?

3. What orders of architecture do you know?

Задание № 8. Переведите следующие выражения (устно): + освещать почти все вопросы по архитектуре; + организация линий, поверхностей, масс и объемов в пространстве; + отличаться от своих предшественников; + античная средиземноморская цивилизация;

Задание № 9. Пересказ текста.

Задание № 10. Расскажите устную тему «Ourflat»

2 Аттестационная работа (1 курс, 1 семестр)

Вариант № 2

Задание № 1. Письменно переведите предложения.

1. Вы не могли бы ответить на мой вопрос?
2. Тед не смог прочитать слово.
3. Ребенку не нужно одевать шапку. Тепло.
4. Тебе надо бы его подождать.

Задание № 2. Поставить глаголы в Pr. Ind., Pr. Cont., Past Ind.

1. I (like) to stay with my granny very much?
2. She (watch) her favourite program.
3. Why people (wear) raincoats and (carry) big umbrellas?
4. I (hope) (watch) a big fight now.

Задание № 3. Задать 4 типа вопроса.

1. Boris (to write) a letter?
2. It (to be) raining .
3. The wind (to blow) from the west?
4. She (stand) in the middle of the street.

Задание № 4. Поставить предл. в вопросительную и отрицательные формы.

1. I also enjoyed English lessons.
2. I am very interested in learning English.
3. I always wanted to become a programmer or maybe a businesswoman.

Задание № 5. Напишите транскрипции следующих слов: receiving, draw, approval, discuss, exact, client, requirements.

Задание № 6. Прочитать и перевести абзац текста.

Задание № 7. Ответить на вопросы. 1. What does the order consist of?

2. What determined the design of the order?
3. Why did the Greek orders inspire Western architecture?

Задание № 8. Переведите следующие выражения (устно): + группироваться вокруг перистилия; + отверстие в крыше; + примыкающие комнаты; + раскопки в Остии; + неровная поверхность участка; + лестничные пролеты; + метод строительства

Задание № 9. Пересказ текста.

Задание № 10. Расскажите устную тему «Our seasons».

2 Аттестационная работа (1 курс, 1 семестр)

Вариант № 3

Задание № 1. Письменно переведите предложения.

1. Я не мог поверить этому.
2. Ей не надо платить за это. Ее муж оплачивает каждый месяц.
3. Этому инженеру не надо делать проект.
4. Тебе не стоило покупать эти туфли.

Задание № 2. Поставить глаголы в Pr. Ind., Pr. Cont., Past Ind. 1. Heavy storms (damage) a great number of areas?

2. My friend (issue) this article?
3. He (give) him an English magazine
4. When the children (arrive) home?

Задание № 3. Задать 4 типа вопроса.

- Heavy storms (damage) a great number of areas?
2. My friend (issue) this article?
 3. He (give) him an English magazine
 4. When the children (arrive) home?

Задание № 4. Поставить предл. в вопросительную и отрицательные формы.

1. I also think that the knowledge of foreign languages helps in everyday life and career.

2. Two years ago I (travel) much around Europe.

3. I (visit) France, Germany, Belgium, the Netherlands and the United Kingdom now.

Задание № 5. Напишите транскрипции следующих слов: creative, science, consider, survive, style, basic, guide, submits, complete.

Задание № 6. Прочитать и перевести абзац текста.

Задание № 7. Ответить на вопросы. 1. What other meanings of the word "order" do you know? 2. What architectural forms did the Romans prefer?

3. What greatest temples of Roman architecture do you know?

Задание № 8. Переведите следующие выражения (устно): нашей эры;

+ под влиянием Востока;

+ достигнуть высшей точки в развитии;

+ православные общины;

+ базиликальный и центрический типы;

Задание № 9. Пересказ текста.

Задание № 10. Расскажите устную тему «Myweekdays ».

2Аттестационная работа (1 курс,1 семестр)

Вариант № 4

Задание № 1. Письменно переведите следующие предложения.

1. Ребенок должен уметь кушать сам.

2. Тебе не нужно просить его о помощи. Я могу помочь.

3. Вам не следовало опаздывать.

4. Могу я подождать Ника в офисе.

Задание № 2. Поставить глаголы в Pr. Ind., Pr. Cont., Past Ind.

1. I (ask) him about his holiday?

2. He (introduce) me to his friends?

3. We (discuss) many questions after work?

4. They (to be) going to sell milk in this shop?

Задание № 3. Задать 4 типа вопроса.

1. We revise this rules in the lesson.

2. They sell milk in this shop

3. When you (to be) going to complete this project?

4. Together (we pick)fruit and vegetables?

Задание № 4.4. Поставить предл. в вопросительную и отрицательные формы.

1. There the knowledge of English helped me a lot.

2. As you see, my biography (be) very long yet.

3. We (meet) in the lessons and (tell) about myself after vacations.

Задание № 5. Напишите транскрипции следующих слов: coexistence, recognition, almost, roman, terminology, strength, which, finally, appeared.

Задание № 6. Прочитать и перевести абзац текста.

Задание № 7. Ответить на вопросы.

1. Why are the Romans called the great builders and engineers?

2. What ancient Roman towns do you know?

3. What was the influence of Roman architecture on the resulting styles?

Задание № 8. Переведите следующие выражения (устно):

+ церковь Святой Софии;

+ покрывать штукатуркой, мозаикой;

+ неопишуемая красота;

+ ярко освещенное пространство

Задание № 9. Пересказ текста.

Задание № 10. Расскажите устную тему «Ourflat».

II семестр:

I – рубежная аттестация

Грамматика: Повторение Pr.Ind., Pr. Cont., Past Ind., Новые темы: Past Continuous Tense, Future Indefinite, Future Continuous,

Тема: «Welcome», « Cities like people».

1 Аттестационная работа_1 курс_II семестр

Вариант № 1

1. Поставить в Past Ind., Past Cont., Future Ind.

1. Computers are electronic machines.
2. They communicate with the user, perform different kinds of arithmetic operations, such as addition, subtraction, division and multiplication, solve a series of logical problems and make thousands of logical decisions.
3. Modern computers operate quickly and accurately.

2. Ответить на следующие вопросы.

1. What was the 1st calculating device?
2. What is the abacus? Do people still use it nowadays?
3. Who invented calculus?

3. Перевести на английский язык.

1. Что он сейчас делает? - Он изучает панель приборов в автомобиле.
2. Какие приборы находятся на этой панели? - Спидометр, тахометр, амперметр и другие - Понятно.
3. А что делают Петр и Анна? - Они наблюдают за показаниями тахометра.

4. Исправить ошибки в следующих предложениях.

1. He often work on a computer.
2. My friends doesn't learn any programming language.
3. What operations a modern computer performs?

5. Ответьте на следующие вопросы.

1. What is the capital of Great Britain?
2. Name three parts of London.
3. What kind of interesting places are there in London?
4. Where is Trafalgar Square?
5. Where is the official London residence of the Queen?

1 Аттестационная работа 1 курс, II семестр

Вариант № 2

1. Поставить в Past Ind., Past Cont., Future Ind.

1. Every computer consists of software and hardware.
2. Information in the form of programmes and data is called software, but the pieces of equipment that make up the computer system are known as hardware.
3. The most important item of hardware is the CPU (Central Processing Unit).

2. Ответить на следующие вопросы.

1. When did the 1st real calculating machine appear?
2. What is Charles Babbage famous for?
3. What were the girls doing in the lab?

3. Перевести на английский язык.

1. Что сейчас показывает амперметр? - Он показывает +20 А.
2. Генератор переменного тока вырабатывает мощный ток для двигателя.
3. Батарея сейчас разряжается.

4. Исправить ошибки в следующих предложениях.

1. Do you often employ minicomputers? – No, we doesn't.
2. Alex have a new computer notebook.
3. Always computers help people solve difficult tasks.

5. Ответить на вопросы.

1. Where is Great Britain situated?
2. What is the area of the United Kingdom?
3. What is the capital of the country?
4. What is the official language in England?
5. How many rivers are there in Great Britain?

1 Аттестационная работа 1курс, II семестр

Вариант № 3

1. Поставить в Past Ind., Past Cont., Future Ind.

1. This is the electronic unit at the centre of the computer system.
2. The brain of the computer is the processor.
3. It does all the processing and controls all the devices in the computer system.

2. Ответить на следующие вопросы.

1. Were they using a multimeter or a tachometer?
2. What is a multimeter used for?
3. What are the main parts of a multimeter?
5. What are the students going to do next time?

3. Перевести на английский язык.

1. Компьютеры состоят из программного и аппаратного обеспечения.
2. Компьютерная сеть Интернет охватывает миллионы пользователей.
3. Компьютер получает, хранит и обрабатывает информацию

4. Исправить ошибки.

1. We will be study the properties of copper tomorrow.
2. I will preparing for my test yesterday.
3. The students not were measuring the value of the current at the lesson.

5. Ответить на вопросы.

1. What is the capital of the Chechen Republic?
2. Are there any sights in Grosny? What are they?
3. What does our diploma mean?
4. Who helps students master professional skills?
5. What part does our Institute play?

1 Аттестационная работа 1 курс, II семестр

Вариант № 4

1. Поставить в Present Ind., Past Cont., Future Ind.

1. The very first calculating device was the ten fingers of a man's hand.
2. This, in fact, is why today we still count in tens and multiples of tens.
3. Then people invented the abacus, a bead frame in which the beads move from left to right.

2. Ответить на следующие вопросы.

1. What are the students going to do next time?
2. What did scientists predict in the 1980s?
3. What and for will people use terminals?

3. Задать разные типы вопросов к следующему тексту.

Computers are electronic machines. They communicate with the user, perform different kinds of arithmetic operations, such as addition, subtraction, division and multiplication, solve a series of logical problems and make thousands of logical decisions. Modern computers operate quickly and accurately. However, they don't think.

4. Перевести на английский язык.

1. Вчера мы изучали электронные приборы в лаборатории с 2-х до 4-х часов дня.
2. Что вы делали? - Мы проверяли приборы, затем измеряли сопротивление разных проводников: медных, алюминиевых, железных.
3. - Что он делал? - Он работал с мультиметром.

Он использовал зажимы "крокодил" и соединял провода в цепи.

5. Ответить на вопросы.

1. Is Grozny the industrial and cultural centre of the Chechen Republic?
2. Where is the Chechen Republic situated?
3. How many rivers are there in the Chechen Republic?
4. What kind of mineral resources does the Chechen Republic have?
5. What kind of lakes are there in our Republic?

Контрольная работа № 2 (1 курс, 2 семестр)

Задания:

- 1) Заполните пропуски артиклями, где это необходимо:

1. This is... book. It is my ... book. 2. Is this your ... pencil? — No, it isn't my ... pencil, it is my sister's ... pencil. 3. I have ... sister. 4. My ... sister is ... engineer. 5. My sister's ... husband is ... doctor. 6. Please send Jane...text. 7. This is his...flat. 8. Please give me ...black pencil. 9. Read ...text, please. 10. Minsk is ...big city.

2) Поставьте следующие существительные во множественное число:
a baby, a plant, a lemon, a peach, a banana, a brush, a star, a mountain, a tree, a shilling, a king, the waiter, a queen, a man, an eye, a shelf, a box, a city, a boy, a goose, a watch, a mouse, a dress, a toy, the sheep, a tooth, a child, a ox, a deer, a life, a tomato.

- 3) Заполните пропуски соответствующей формой глагола to be:

1. Ben... my friend. 2. He... a teacher. 3. I... in my room. 4. "... Tommy and Billy babies?" "Yes, they ...". 5. We... students. 6. She... a teacher.

- 4). Переведите на английский язык:

а) Моя ручка, семь кроватей, мой галстук, девять ручек, десять галстуков, мои ручки.
б) 1. Найдите мой галстук. 2. Познакомьтесь с Беном. 3. Пришлите мне семь галстуков. 4. Пришлите Бесс семь ручек. 5. Пришлите мне мою ручку. 6. Разыщите Петра.

- 5) Раскройте скобки, употребляя глаголы в одном из следующих времен: Present Continuous, Present Indefinite, Past Indefinite, Future Indefinite.

1. My friend (to go) to the library every Wednesday. 2. He (not to go) to the country yesterday.
3. We (to go) to the south next summer. 4. Who usually (to do) his homework in this room? This student (to do) . 5. Who (to do) his homework there now?

- б) Подчеркните нужную форму глагола.

1. There (is, are) a large table in my room. There (is, are) three windows in my classroom. 3. There (is, are) table and four chairs in my sister's room. 4. There (is, are) a blackboard, four tables and five chairs in our classroom. a.

7) Дать три формы неправильных глаголов.

to build, to come, to begin, to draw, to be, to become, to eat, to bring, to drink, to catch, to break, to buy.

8. Дайте определение следующих слов:

there are, may, was, makes, are left,

9. Дайте синонимы следующих слов.

totally, operation, freedom, latter, importance, greater, increase,

10. Переведите следующие предложения.

1. An industry may be almost totally planned, as it was in the Soviet Union. 2. An industry may be almost totally unplanned, as it is in the USA. 3. The name of the American economic system is capitalism. 4. Government also makes investments and regulates trade. 5. The United States is an example of an unplanned economy.

economic system, government, management, activity.

II – рубежная аттестация

Грамматика: Future Indefinite Tense and Present Perfect Tense

Тема: «The Industry of Great Britain», «The celebrations».

2 Аттестационная работа (1 курс, 2 семестр)

Вариант № 1

Задание № 1. Задание № 1. Раскройте скобки, употребляя глаголы в Present, Past или Future Indefinite.

1. I (to go) to bed at ten o'clock every day. 2. I (to go) to bed at ten o'clock yesterday. 3. I (to go) to bed at ten o'clock tomorrow. 4. I (not to go) to the cinema every day. 5. I (not to go) to the cinema yesterday

Задание № 2. Раскройте скобки, употребляя глаголы в Present Perfect или Past Indefinite.

1. My father knows so much because he (to travel) a lot.

2. I (to see) Pete today.

3. She (to see) this film last Sunday.

4. Alex (to meet) his friend two hours ago.

5. I just (to meet) our teacher.

Задание № 3. Задать 4 типа вопроса.

1. I (like) to stay with my granny very much?

2. She (watch) her favourite program.

3. Why people (wear) raincoats and (carry) big umbrellas?

4. I (hope) (watch) a big fight now.

Задание № 4. Поставить предл. в вопросительную и отрицательные формы.

1. In summer many relatives (come) to visit us.

2. Now they (use) a chance to spend several weeks in beautiful Sochi.

3. Some months later I (finish) school № 5 in Sochi.

4. I did well in all the subjects but my favourite subjects at school were Physics and Computer Science.

Задание № 5. Напишите транскрипции следующих слов: science, license, regulation, official, detailed, specify.

Задание № 6. Прочитать и перевести абзац текста Building Material

Задание № 7. Ответить на вопросы.

1. What was a major change in the role of the architect?
2. Why was the response of the architect?
3. Was one of the first buildings for which the architect and engineer were separate persons?

Задание № 8. Переведите следующие выражения (устно):

новые проекты зданий, наука о строительстве, лицензионный профессионал, рост профессионализма, обязанность архитектора, промышленный век.

Задание № 9. Пересказ текста. BuildingMaterial

Задание № 10. Расскажите устную тему

2 Аттестационная работа (1 курс, 2 семестр)

Вариант № 2

Задание № 1. Раскройте скобки, употребляя глаголы в Present, Past или Future Indefinite.

1. I (not to go) to the cinema tomorrow. 2. You (to watch) TV every day? 3. You (to watch) TV yesterday? 4. You (to watch) TV tomorrow? 5. When you (to leave) home for school every day?

Задание № 2. Раскройте скобки, употребляя глаголы в Past Indefinite или Past Continuous.

1. He (not to sleep) when father came home. He (to do) his homework. 2. When I (to go) to school the day before yesterday, I met Mike and Pete. 3. They (to talk) and (to laugh). They told me a funny story. Soon I (to laugh), too. 4. I still (to laugh) when we came to school. After school I (to tell) this story at home. My father and mother (to like) it very much. 5. When we were in the country last summer, I (to go) to the wood one day.

Задание № 3. Задать 4 типа вопроса.

1. Boris (to write) a letter?
2. It (to be) raining .
3. The wind (to blow) from the west?
4. She (stand) in the middle of the street.

Задание № 4. Поставить предл. в вопросительную и отрицательные формы.

1. I also enjoyed English lessons.
2. I am very interested in learning English.
3. I always wanted to become a programmer or maybe a businesswoman.
4. They (stand) in the middle of the street.

Задание № 5. Напишите транскрипции следующих слов: receiving, draw, approval, discuss, exact, client, requirements.

Задание № 6. Прочитать и перевести абзац текста «A contract between the client and the contractor.»

Задание № 7. Ответить на вопросы. 1. What is surveying and styling of the building?

2. Why may the excavation of the basement be very expensive?

3. What is a role of the building's foundation?

Задание № 8. Переведите следующие выражения (устно): крупномасштабные здания, подготовительный план, исправлять любые дефекты, точные измерения каждой части здания, сложная дисциплина, управление строительством.

Задание № 9. Пересказ текста. The most important and widely used building materials.

Задание № 10. Расскажите устную тему

2 Аттестационная работа (1 курс, 2 семестр)

Вариант № 3

Задание № 1. Раскройте скобки, употребляя глаголы в Present, Past или Future Indefinite.

1. I (not to go) to the cinema tomorrow. 2. You (to watch) TV every day? 3. You (to watch) TV yesterday? 4. You (to watch) TV tomorrow? 5. When you (to leave) home for school every day?

Задание № 2. Раскройте скобки, употребляя глаголы в Present Perfect или Past Indefinite.

1. I (to buy) a pair of gloves yesterday. 2. The wind (to blow) off the man's hat, and he cannot catch it. 3. The weather (to change), and we can go for a walk. 4. The wind (to change) in the morning. 5. We (to travel) around Europe last year. 11. My father knows so much because he (to travel) a lot.

Задание № 3. Задать 4 типа вопроса.

1. Heavy storms (damage) a great number of areas?
2. My friend (issue) this article?
3. He (give) him an English magazine
4. The children (arrive) home?

Задание № 4. Поставить предл. в вопросительную и отрицательные формы.

1. I also think that the knowledge of foreign languages helps in everyday life and career.
2. Two years ago I (travel) much around Europe.
3. I (visit) France, Germany, Belgium, the Netherlands and the United Kingdom now.
4. He (give) him an English magazine

Задание № 5. Напишите транскрипции следующих слов: creative, science, consider, survive, style, basic, guide, submits, complete.

Задание № 6. Прочитать и перевести абзац текста «The architectural engineering»

Задание № 7. Ответить на вопросы.

1. When does an architect meet client?
2. Why may the excavation of the basement be very expensive?
3. What is a role of the building's foundation?

Задание № 8. Переведите следующие выражения (устно):

строительные материалы, контроль качества, развитие крепких материалов, воздвигать здание, линия водоснабжения, раскопки экскаватором.

Задание № 9. Перескажте текста. Properties of materials

Задание № 10. Расскажите устную тему

2 Аттестационная работа (1 курс, 2 семестр)

Вариант № 4

Задание № 1. Раскройте скобки, употребляя глаголы в Present, Past или Future Indefinite.

1. When you (to leave) home for school yesterday?
2. When you (to leave) home for school tomorrow?
3. My brother (to go) to work every day.
4. You (to have) a lesson yesterday? — No, I ...
5. What you (to buy) at the shop yesterday? — I (to buy) a book.

Задание № 2. Раскройте скобки, употребляя глаголы в Present Perfect или Past Indefinite.

1. Helen speaks French so well because she (to live) in France.
2. She (to live) there last year.
3. The rain (to stop) and the sun is shining in the sky again.
4. The rain (to stop) half an hour ago.
5. Mary (to buy) a new hat.

Задание № 3. Задать 4 типа вопроса.

1. We revise this rules in the lesson.
2. They sell milk in this shop
3. When you (to be) going to complete this project?
4. Together (we pick)fruit and vegetables?

Задание № 4. Поставить предл. в вопросительную и отрицательные формы.

1. There the knowledge of English helped me a lot.
2. As you see, my biography (be) very long yet.
3. We (meet) in the lessons and (tell) about myself after vacations.

Задание № 5. Напишите транскрипции следующих слов: coexistence, recognition, almost, roman, terminology, strength, which, finally, appeared.

Задание № 6. Прочитать и перевести абзац текста «Buildingconstruction »

Задание № 7. Ответить на вопросы.

1. What must the designer have?
2. What does every element in a building have?
3. When does an architect draw up preliminary plans?

Задание № 8. Переведите следующие выражения (устно): линия электропередачи, опора и фундамент, архитектор проводит периодическую проверку, клиент занимает свое помещение, когда все дефекты устраняются, затем начинается работа на объекте.

Задание № 9. Пересказ текста. Manufactured building materials

Задание № 10. Расскажите устную тему

2 Аттестационная работа (1 курс, 2 семестр)

Вариант № 5

Задание № 1. Раскройте скобки, употребляя глаголы в Present, Past или FutureIndefinite.

1. Yesterday my father (not to read) newspapers because he (to be) very busy. 2. He (to read) newspapers tomorrow. 3. He (to leave) home at a quarter past eight. He (not to take) a bus. 4. Tomorrow he (not to go) to work. 5. Yesterday he (to get) up at nine o'clock.

Задание № 2. Раскройте скобки, употребляя глаголы в Past Indefinite или Past Continuous.

1. I (to go) to the cinema yesterday. 2. I (to go) to the cinema at four o'clock yesterday. 3. I (to go) to the cinema when you met me. 4. I (to do) my homework the whole evening yesterday. 5. I (to do) my homework when mother came home.

Задание № 3. Задать 4 типа вопроса.

1. I (ask) him about his holiday?
2. He (introduce) me to his friends?
3. We (discuss) many questions after work?
4. They (to be) going to sell milk in this shop?

Задание № 4. Поставить предл. в вопросительную и отрицательные формы.

1 He (be) a middle-aged man whose head (be) clear and whose heart (be) honest and simple. 2. The scientists (research) our nature now. 3. Now I (forgive) you.

Задание № 5. Напишите транскрипции следующих слов: corrected, approval, inspection, beauty, entail, special, requisite, capable, whole, human.

Задание № 6. Прочитать и перевести абзац текста «Architectural design of a building. »

Задание № 7. Ответить на вопросы.

1. What does every element in a building have?
2. What is the main reason why architecture considers as a difficult art?
3. What must the designer have?

Задание № 8. Переведите следующие выражения (устно):

кроме этого инженер-архитектор связан, технологические аспекты зданий, различные строительные коды, включая свойства и поведение строительных материалов, правила жизненной безопасности, анализ окружающей среды и проект

Задание № 9. Перескаж текста. Advanced composite materials

Задание № 10. Расскажите устную тему

I Аттестационная работа (2 курс, 3 семестр)

Вариант № 2

Задание № 1. Написать транскрипцию слов.

They are: high electric and heat conductivity, high corrosion resistance, non-magnetic qualities, light weight and easiness to fabrication.

Задание № 2. Переведите следующие выражения. Металлы имеют несколько характеристик, высокая проводимость тока, высокая проводимость тепла, сильное сопротивление коррозии, отсутствие магнетических качеств, легкий вес.

Задание № 3. Поставить предложения в Passive и Active Voice.

1. Copper, aluminium and some other metals are referred to as non-ferrous metals.
2. All metals are divided into ferrous and non-ferrous metals.
3. Metals have some characteristics.
4. Metals play the main role in the hard industry.

Задание № 4. Верны или неверны следующие утверждения.

- Ferrous are metals and alloys the main component of which is not iron.
- Non-ferrous metals are extracted from minerals such as magnesium, carbonate and tin oxides, chloride.
- The ferrous metals are iron, steel and their alloys.

Задание № 5. Задать четыре типа вопроса к данным предложениям.

1. In England the traffic keeps to the left.
2. The students had five examinations.
3. I will know the result in a day.

Задание № 6. Ответить на вопросы.

What is the oldest and best known metal?

What are zinc's characteristics?

What colour of zinc do you know?

Задание № 7. Поставьте глаголы, данные в скобках, во времена групп Perfect или Perfect Continuous. Перепишите и переведите предложения на русский язык.

1. I see the snow (stop).
2. His wife was not in. She (go) out a half an hour before.
3. I suppose I (read) the book by that time.
4. Tell me what you (do) in my absence.

Задание № 8. Перепишите и переведите предложения на русский язык. Выпишите из каждого глагол – сказуемое и определите его видовременную форму. Напишите форму инфинитива глагола.

1. We stayed in the garden for a long time.
2. She had finished packing by three o'clock.
3. Public opinion is changing.
4. I shall come along as often as possible.
5. Jerry has been discussing it with her this evening.
6. He will be asking me the same question tomorrow.

Задание № 9. Прочитать и перевести абзац текста «Non-ferrous metals».

Задание № 10. Рассказать устную тему Spare time.

I Аттестационная работа (2 курс, 3 семестр)

Вариант № 3

Задание № 1. Написать транскрипцию слов. Ferrous are metals and alloys the main component of which is not iron.

- Non-ferrous metals are extracted from minerals such as magnesium, carbonate and tin oxides, chloride.
- The ferrous metals are iron, steel and their alloys.

Задание № 2. Переведите следующие выражения: второй сплав- бронза, сплав меди и олова, металл, который не подвергается коррозии, олово – серебристый металл, продукты питания, для продуктовых контейнеров.

Задание № 3. Поставить предложения в Passive и в ActiveVoice.

1. Such combination included metals lead, zinc.
2. Bronze contains 20% tin and 80% copper.
3. It was mentioned zinc. Согласование времен. Косвенная речь 14
4. Copra-nickel is used for the present “silver” coins.

Задание № 4. Верны или неверны следующие утверждения.

Today copper and iron have taken its place.

Now lead is a very expensive metal. But lead is still used for roofing and for making waste pipes and sink traps because it is easily bent into shape, storage battery

Задание № 5. Задать четыре типа вопроса к данным предложениям.

1. A year ago she had long fair hair.
2. Buckingham Palace has a police station, two post offices, a hospital, a bar, two sports clubs, a disco, a cinema and a swimming pool.
3. In the nearest future London will have a population of nearly 10 million people.

Задание № 6. Ответить на вопросы. For what lead is used?

- What metal can you see mostly in our life?
- What copper alloys do you know?
- What are specific characteristics of copper?

Задание № 7. Поставьте глаголы, данные в скобках, во времена групп **Perfect** или **PerfectContinuous**. Перепишите и переведите предложения на русский язык.

1. Some time ago Jill’s hair was short but now it is long. She (grow) it again.
2. Tomorrow the terrorists (hold) the hostages for three days.
3. We were late for the station. The train (start) two minutes before we came.
4. Are you still watching television? You (watch) it since I left for work in the morning.

Задание № 8. Перепишите и переведите предложения на русский язык. Выпишите из каждого глагол – сказуемое и определите его видовременную форму. Напишите форму инфинитива глагола.

1. The situation calls for immediate actions.
2. This is the third time Bill has phoned his friend this evening.
3. Parliament resumed the emergency debate last Friday.
4. The introduction of new technologies will promote economic development.
5. I had never seen Mr. Johnson so sad before our last meeting.
6. The population of the world is rising very fast.

Задание № 9. Прочитать и перевести абзац текста «Toolsfrommetal».

Задание № 10. Рассказать устную тему Prominentpeople.

I Аттестационная работа (2 курс, 3семестр)

Вариант № 4

Задание № 1. Написать транскрипцию слов. The second is *bronze*. Bronze is an alloy of copper and tin. *Tin* is a silvery metal which is not corroded by air. Tin plate is suitable for cans in which acid fruit and other food-stuffs are packed because tin is not attacked by weak acids.

Задание № 2. Переведите следующие выражения: вредный, пора рассказать, для окон и дверей, очень дорогой материал, серные кислоты, от радиоактивных веществ.

Задание № 3. Поставить предложения в Passive и Active Voice.

1. We want to tell some words about lead.
2. Lead melts at 327°C.
3. Zinc has been used for roofing recently.
4. Tin is being used for making cans.

Задание № 4. Верны или неверны следующие утверждения.

Lead is still used for roofing and for making waste pipes and sink traps.

It is easily bent into shape, storage battery (accumulator) plates, cable sheaths, storage tanks.

It is used for lead shot, solder, screens to stop harmful radiation from radioactive substances.

Задание № 5. Задать четыре типа вопроса к данным предложениям.

1. They have got a nice cat.
2. We had a large lunch yesterday.
3. It will probably rain soon.

Задание № 6. Ответить на вопросы.

1. For what lead is used?
2. For what zinc is used?
3. For what copper is used?

Задание № 7. Поставьте глаголы, данные в скобках, во времена групп **Perfect** или **Perfect Continuous**. Переведите предложения на русский язык.

1. George smokes. He (smoke) for five years.
2. They already (paint) the walls in their flat.
3. The builder says he (finish) the roof by next week.
4. When I got to the car park I realised that I (lose) my keys.

Задание № 8. Перепишите и переведите предложения на русский язык. Выпишите из каждого глагол – сказуемое и определите его видовременную форму. Напишите форму инфинитива глагола.

1. It's raining again. Take your umbrella.
2. My mother always forgets my birthday.
3. I am sure Andrew will come to see us this evening.
4. I knew that he was waiting for somebody.
5. As soon as she came in I knew I had seen her before.
6. It has been snowing since Tuesday.

Задание № 9 Прочитать и перевести абзац текста. «Ferrous metals».

Задание № 10. Рассказать устную тему Sport.

Контрольная работа № 3 для заочников

- 1) Раскройте скобки, употребляя глаголы в одном из следующих времен: Present Continuous, Present Indefinite, Past Indefinite, Future Indefinite.

1. My friend (to go) to the library every Wednesday. 2. He (not to go) to the country yesterday.
3. We (to go) to the south next summer. 4. Who usually (to do) his homework in this room? This student
(to do) .5. Who (to do) his homework there now?

2) Раскройте скобки, употребляя глаголы в одном из следующих времен: Present Indefinite, Present Perfect, Past Continuous, Past Indefinite

1. She just (to go) out. 2. She (to leave) the room a moment ago. 3. The morning was cold and rainy, but since ten o'clock the weather (to change) and now the sun is shining brightly. 4. His mother (to make) supper in the kitchen when I (to come).

3) Переведите на английский язык обращая внимание на употребление оборота (there is, there are).

1. В нашем городе много школ и пять институтов. 2. В центре города находится театр. 3. Театр находится в центре Москвы. 4. Ошибка в пятом предложении. 5. В пятом предложении есть ошибка.

4) Вставьте some или any .

1. I don't think we've got ... time left. 2. Please take ... magazine you like. 3. I haven't got ... questions.

5) Поставьте следующие предложения в отрицательную и вопросительную формы.

1. He translated very many letters into English.

2. The teacher gave us a lot of homework.

3. We have already solved the problem.

4. The boy has seen a new film.

6). Переведите на английский язык, употребляя модальные глаголы can, must или их эквиваленты.

1. Я умею говорить по-английски. 2. Вы не должны опаздывать. 3. Этот ребенок должен проводить больше времени на свежем воздухе. 4. В прошлом году я не умел плавать. 5. Я думаю, она не сможет сделать эту работу. 6. Завтра я буду свободен и смогу помочь тебе.
7). ***Вставьте much, many, little, few.***

1. Students don't usually have _____ money. 2. Do you need _____ copies. 3. He drank _____ water and felt much better. 4. Hurry up! We have very _____ time. 5. We spent _____ days in the country. 6. He gave _____ examples.

8. Дайте определение следующих слов:

will increase, must, these, the, from.

9. Дайте синонимы следующих слов.

quantity, possible, broadly, advance.

10. Переведите следующие предложения

faster, better, increase

Критерии оценки

Регламентом БРС ГГНТУ предусмотрено 20 баллов за аттестацию.

Контрольная работа состоит из 10 заданий, за каждое правильно выполненное задание, соответствующее эталону, студент получает 2 балла. Для успешного написания проверочной работы необходимо набрать 20 баллов

1 балл–задания выполнены правильно частично.

2 балл–задания выполнены правильно, со знанием грамматических явлений, изучаемого языка.

3 семестр

I – рубежная аттестация

Текст (чтение, перевод, пересказ).

Согласование времен. Косвенная речь 17

Грамматика: весь пройденный материал.

Устные темы: MInstitute.Moscow. RussianFederation. London. Great Britain.

MyNativeCity.Seasons.

Задания:

Работа с текстом, включая чтение, перевод, пересказ.

Вопросы к тексту.

Комментирование грамматического материала (работа по карточкам): Present Indefinite, Present Continuous, Past Indefinite, Past Continuous, Future Indefinite, Future Continuous, Present Perfect, Modal verbs.

Сообщения по заданным устным темам.

II – рубежная аттестация

2 Аттестационная работа (2 курс, 3 семестр)

Вариант № 1

Задание № 1.Написать транскрипцию слов.

Sheet, realize, support, considering, strength, called, compressive, tensile.

Задание № 2. Переведите следующие выражения. Упоминать строительные материалы, в первом случае, использовать в 2-х основных способах, важно понять, компоненты связываются, первый тип делается, в то же самое время. **Задание №**

3.Переведите на английский язык

Их находят – их нашли – их найдут.

Его прощают – его простили – его простят.

Её ищут – её искали – её будут искать.

Мне предлагают – мне предложили – мне предложат.

Нас встречают – нас встретили – нас встретят.

Вам дают – вам дали – вам дадут.

Задание № 4.Поставить в Passive.

1. Einstein presented his theory of relativity in 1905.

2. We measure volume in cubic centimeters.

3. They will equip the laboratory with modern devices next week.

4. We were conducting this experiment before you came.

5. He had completed all necessary measurements by 3 o' clock.

Задание № 5.Задать 4 типа вопроса.

1. It rains a lot in autumn.

2. I have written several letters to my friends this week

3. The interesting articles are being translated.

4. I have been waited for him recently.

Задание № 6. Ответить на вопросы. 1. What is a modern technology? 2. What materials' forms are very important in all masonry structure? 3. What factors must the civil engineer consider? 4. What can you tell something about the most accurate method of measuring proportions?

Задание № 7. Экзаменационное задание. Complexobject

Задание № 8. Передайте следующие предложения в косвенной речи.

1. "Do you know where the Browns live?" we asked a passerby. 2. "There are a lot of trains to my station on Sunday," said Andrew to us. "You will have no problems getting to my country place." 3. "Do you often meet my sister at the library?" he asked me. 4. "Will the teacher return our exercise books today?" asked Nick.

Задание № 9. Прочитать и перевести абзац текста. Пересказ текста.

Задание № 10. Рассказать устную тему.

2 Аттестационная работа (2 курс, 3 семестр)

Согласование времен. Косвенная речь 18

Вариант № 2

Задание № 1. Написать транскрипцию слов. Structural, third, lighter, right, faster, timber, fixed, because, concrete, technology, physical, measure.

Задание № 2. Переведите следующие выражения. Очень важно для любого проектировщика, выбирать и приспособливать, вот поэтому некоторые материалы, многие факторы должны рассматриваться инженерами гражданского строительства, с целью укрепления, известь, гипс, цемент.

Задание № 3. Переведите на английский язык.

Мне рассказывают – мне рассказали – мне расскажут.

Ему показывают – ему показали – ему покажут

Нас спрашивают – нас спросили – нас спросят.

Им отвечают – им ответили – им ответят.

Её оставляют – её оставили – её оставят.

Вас забывают – вас забыли – вас забудут.

Задание № 4. Поставить в Passive.

1. They make a very good wine in Spain.

2. We turn on the light when it is dark.

3. They are building a bridge over the river.

4. By 6 o' clock they will have finished the work.

5. We were analyzing the results of their research from 4 to 6 o' clock yesterday.

Задание № 5. Задать 4 типа вопроса.

1. The situation calls for immediate actions.

2. This is the third time Bill has phoned his friend this evening.

3. I had never seen Mr. Johnson so sad before our last meeting.

4. The population of the world is rising very fast.

Задание № 6. Ответить на вопросы. 1. What kind of material is the most widely used for the purpose of binding together masonry units such as a stone and a brick? 2. What material is also known to be the most important component of concrete? 3. What kind of material may be considered an artificial conglomerate of crushed stone? 4. What can you tell about an important class of cement?

Задание № 7. Экз. задание. Степени сравнения прилаг.

Задание № 8. Передайте предложения в косвенной речи.

1. "My nephew is a very capable young man," said the woman. "He has just graduated from college, but he is already a very skilful specialist." 2. "Sit still and don't move your head," said the doctor to me. 3. "I want to know how your cousin likes working at this hospital," said Vera to Helen. 4. "Don't forget to bring your exercise books tomorrow," the teacher said to us. "

Задание № 9. Прочитать и перевести абзац текста. Пересказ текста.

Задание № 10. Рассказать устную тему.

2 Аттестационная работа (2 курс, 3 семестр)

Вариант № 3

Задание № 1. Написать транскрипцию слов. Designer, availability, properties, among, since, disadvantages, quality, hardening, purpose, particular.

Задание № 2. Переведите следующие выражения. Практически все материалы имеют достоинства и недостатки, эти факторы включают: доступность, стоимость, физические свойства материалов, широко используются в строительстве, масштабы для таких целей.

Задание № 3. Переведите на английский язык.

Их видят – их видели – их увидят.

Его слушают – его слушали – его будут слушать.

Её оставляют – её оставили – её оставят.

Нас защищают – нас защищали – нас защитят.

Мне разрешают – мне разрешили – мне разрешат.

Им покупают – им купили – им купят.

Задание № 4. Поставить в Passive.

1. The group spoke to the headmistress yesterday.
2. The young mothers looked after her babies with great care
3. They sent for Jim and told him to prepare a report on that subject.
4. The lecturer is making a report.
5. The students translated this text last lesson.

Задание № 5. Задать 4 типа вопроса.

1. I will be flying over the Atlantic Ocean at 12 o'clock tomorrow.
2. Parliament resumed the emergency debate last Friday.
3. The introduction of new technologies will promote economic development
4. The academic year was divided into two terms

Задание № 6. Ответить на вопросы. 1. What materials are mostly used in Russia? 2.

What can you tell about building technology in Russia? 3. Can you tell about the main characteristics of concrete? 4. What are the chief principles of plastics classification?

Задание № 7. Экз. задание. Глаголы to be и to have.

Задание № 8. Передайте предложения в косвенной речи.

1. "How can I get to the circus?" asked the girl. "Take tram number five," said the man. 2. "I am very sorry, Kate," said Mike, "I have forgotten to bring your dictionary." 3. "When does your mother go shopping?" asked the neighbour

4. "Do you know where the Browns live?" we asked a passerby.

Задание № 9. Прочитать и перевести абзац текста. Пересказ текста.

Задание № 10. Рассказать устную тему

2 Аттестационная работа (2 курс, 3 семестр)

Вариант № 4

Задание № 1. Написать транскрипцию слов. Such, increasing, variety, high, coloured, extremely, furnace, chemical, uniform, crushed, conglomerate, proportion, weigh.

Задание № 2. Переведите следующие выражения: таким образом, цемент является самым важным компонентом, подобный нейтральный материал с раствором, очень важно знать о пропорциях, самый точный метод измерения пропорций, требуемое количество.
Согласование времен. Косвенная речь 20

Задание № 3. Переведите на английский язык.

Меня посылают – меня послали – меня пошлют.

Ему помогают – ему помогли – ему помогут.

Нам советуют – нам советовали – нам посоветуют.

Им пишут - им писали – им напишут.

Нас зовут – нас позвали – нас позовут.

Ей отвечают – ей отвечали – ей ответят.

Задание № 4. Поставить в Passive.

1. Our specialists have worked out a new experimental flexible line.
2. Scientists discovered an interesting phenomenon in the field of aerodynamic effects last year.
3. Scientists and engineers are developing a lot of new types of electronic and cybernetic devices.
4. Everybody understands prospects of the usage of solar energy.
5. Outer factors will not influence the operation of conveyor.

Задание № 5. Задать четыре типа вопроса к данным предложениям.

1. We want to tell some words about lead.
2. Lead melts at 327°C.
3. Zinc has been used for roofing recently.
4. Tin is being used for making cans.

Задание № 6. Ответить на вопросы. 1. What factors do influence mass production of prefabricated large-side concrete structural elements? 2. What are new tendencies in the choice of building materials? 3. What are the advantages of reinforced concrete? 4. Which material can be used to the best advantage for a particular part of the building?

Задание № 7. Экз. задание. Структура thereis/ are.

Задание № 8. Передайте предложения в косвенной речи. 1. "There are a lot of trains to my station on Sunday," said Andrew to us. 2. "Do you often meet my sister at the library?" he asked me. 3. "Will the teacher return our exercise books today?" asked Nick. 4. "My nephew is a very capable young man," said the woman. "He has just graduated from college, but he is already a very skilful specialist."

Задание № 9. Прочитать и перевести абзац текста. Пересказ текста.

Задание № 10. Рассказать устную тему

Текст (чтение, перевод, пересказ).

Вопросы

к зачету по дисциплине «Английский язык»
для студентов 1-го курса (ОФО, ЗФО)

1 семестр

1. Grammar

1. Местоимения (личные, указательные, притяжательные).
2. Существительное (множественное число)
3. Числительное (количественное и порядковое; дроби)
4. Типы вопросов.
- 5.оборот *there is / are*.
6. Степени сравнения прилагательных и наречий Согласование времен. Косвенная речь 21
7. Present Continuous Tense.
8. Present Indefinite Tense.

2. Устные темы

1. "My visit card".
2. "Talking about my family".
3. "Talking about my friend".
4. "Talking about my house".
5. "My working day".

2 семестр

1. Grammar

1. Past Indefinite Tense.
2. Past Continuous Tense.
3. Future Indefinite Tense.
4. Future Continuous Tense.
5. Present Perfect Tense.
6. Modal verbs (*can, may, must, need, ought* и их эквиваленты)

3. Устные темы

1. London
2. Great Britain
3. Moscow
4. Russian Federation
5. My native city

Критерии оценки

Регламентом БРС ГГНТУ предусмотрено 20 баллов за зачет

На зачёт выносятся лексические и грамматические темы, изученные в рамках 1-2 семестров. Каждому студенту необходимо дать ответ на теоретический вопрос, касающийся знания правил, и перевести текст профессиональной направленности,

выполнить задания, данные к нему. При переводе текста студентам разрешается пользоваться словарём.

Зачтено – теоретическое содержание учебного материала освоено студентом в полном объеме, без пробелов, необходимые практические навыки в основном сформированы, однако они могут быть недостаточными; перевод текста и задания к нему выполнены, хотя некоторые ответы могут содержать лишь незначительные ошибки; качество выполнения оценено числом баллов, близким к максимальному,

Не зачтено - теоретическое содержание материала не освоено, необходимые практические навыки работы с текстом не сформированы, большинство заданий не выполнено, либо качество их выполнения очень низкое;

Согласование времен. Косвенная речь 22

3 семестр

Вопросы

к экзамену по дисциплине «Английский язык»
для студентов 2-го курса (ОФО, ЗФО)

1. Revision of studied grammar material

Вопросы к экзамену:

I. Грамматика: (правила, упражнение)

1. Числительные,
2. Глаголы *to be, to have*.
3. Местоимения
4. Существительное.
5. Типы вопросов (общий, альтернативный, специальный и разделительный).
6. Структура *there is (are)*;
7. Прилагательное. Степени сравнения прилагательных и наречий.
8. Модальные глаголы (*can, may, must, need, ought* и их эквиваленты).
- 9.оборот *to be going to*
10. Present Indefinite Tense
11. Past Indefinite Tense
12. Future Indefinite Tense
13. Present Continuous Tense
14. Past Continuous Tense
15. Future Continuous Tense
16. Present Perfect Tense
17. Past Perfect Tense
18. Future Perfect Tense
19. Present Perfect Continuous Tense
20. Past Perfect Continuous Tense
21. Future Perfect Continuous Tense
22. Passive voice (all verb tenses)
23. Infinitive. Gerund.
24. Participle I. Participle II.
25. Direct and indirect speech
26. Sequence of tenses
27. Conditional sentences.
28. Types of subordinate clauses

II.Тексты по специальности: читать, переводить и пересказывать

III.Устные темы.

Билеты к экзамену

*The Grozny State Oil Technology University
named after acad. M.D. Millionshikov*

Card № 1

1. *Text: read, translate and retell*
2. *Grammar: The Present Perfect Tense (Active)*
3. *Topic: Russia*

Instructor.....Kh. A. Akaeva

Head of chair

Согласование времен. Косвенная речь 23

T.I.Serganova

Критерии оценки

81- 100 **Отлично- «5»** - теоретическое содержание материала освоено полностью, без пробелов, необходимые практические навыки работы с освоенным материалом в основном сформированы, все предусмотренные программой обучения учебные задания выполнены, качество выполнения большинства из них оценено числом баллов, близким к максимальному.

61- Хорошо-«4» - теоретическое содержание материала освоено полностью, без пробелов, некоторые практические навыки работы с освоенным материалом сформированы недостаточно, все предусмотренные программой обучения учебные задания выполнены, качество выполнения ни одного из них не оценено минимальным числом баллов, некоторые виды заданий выполнены с ошибками.

41 -Удовлетворительно-«3» - теоретическое содержание материала освоено частично, но пробелы не носят существенного характера, необходимые практические навыки работы с освоенным материалом в основном сформированы, большинство предусмотренных программой обучения учебных заданий выполнено, некоторые из выполненных заданий, содержат ошибки.

Неудовлетворительно- «2» - теоретическое содержание материала освоено частично, необходимые практические навыки работы не сформированы, большинство предусмотренных программой обучения учебных заданий не выполнено, либо качество их выполнения оценено числом баллов, близким к минимальному; при дополнительной самостоятельной работе над материалом курса возможно повышение качества выполнения учебных заданий.

Устные темы

1 семестр

About myself

My name is Ann. My surname is Pavlova. I'm seventeen years old. I was born in 1996 in Pskov. I live at 23 New Street. We live in a small flat on the second floor. My phone number is one four seven two five three. I go to the university. I am a first year student. I like English very much. I like reading. I think comics and detective novels are easier to read than real books, but I prefer to read novels. On Saturdays I usually go out with my friends. We often go to the park or to the cinema. I don't like to watch television. I like fresh air and exercise! I play tennis. I like tennis. It's very good for arms and legs. Tennis is fun. My mother is a housewife. She is warm-hearted, generous, optimistic and very lively. She has got long dark hair and green eyes. She isn't very tall. My mother is very beautiful. She is an artistic type. She paints and draws very well. Sometimes she does pottery and sculpture. She goes to art exhibitions as often as possible. My

father is a bus driver. My father's name is Nick. He's got a good sense of humour. He's tall and he's got fair hair and blue eyes. He's in his forties. He's very handsome. He likes photography and his hobby is woodcraft. In summer he goes fishing. It's very relaxing. I've got one brother. His name is Petya. He's seventeen. He is a student. He is kind and friendly. He is very musical. He plays the guitar very well. He makes cassette recordings of friend's records. He listens to music in the evenings and often goes to concerts at weekends. He is quite tall and likes to play basketball. My brother looks very like my mother. I look more like my father. I've got my father's eyes, but I've got my mother's personality. My father's mother and father, my grandparents, live in the village. In spring they like to do some gardening, but their hobby is to watch T.V. They are very kind. They like to give presents. I love them very much. We are all great friends.

Questions:

- 1) What is your name?
- 2) Where and when were you born?
- 3) How old are you?
- 4) What do you do?
- 5) Are you a student?
- 6) Where do you live?
- 7) What is your address?
- 8) What's your phone number?
- 9) What colour hair have you got?
- 10) What colour eyes have you got?

Vocabulary:

artistic —художественный
as often as possible —так часто, как возможно
beautiful —красивая (женщина)
bus driver —водитель автобуса
calf —теленочек
cat —кошка
cassette recording —запись на кассету
clean —убирать, чистить
comics —комиксы
novel —роман

My family

Every family where everyone is responsible for its comfort, success in work, health and good spirits must be a strong unit. We ought not to forget that we are members of society and family is the most important thing for each of us. The children whose parents take proper care of them are very grateful to them either now or afterwards when they become grown-ups.

As for my family, it is not large. There are four of us: a father, a mother, a brother and me. We love each other and try to help each other. We are very anxious when any of us is unhappy in some way.

My father is 38. He is a doctor. He works at a hospital. He treats people and gives them health and advice. I know he is respected by his patients.

My mother is 35. Her work at a factory is hard, but she likes it very much.

My brother is younger than me. He is 10 years old. He is a schoolboy. He is a good tennis player. I have seen him playing tennis several times. He likes me to come to the stadium and see him playing tennis. My father and mother sometimes go there too. Certainly my mother is the housekeeper in our family. She is a very good cook. She knows what is necessary for our family. She goes shopping and cooks very nice and tasty things. All of us try to help her whenever we can. Dad often goes to the market. I go to the dairy and my brother goes to the baker's.

Our grandparents do not live with us. They come to see us and we call them very often. We usually get together on our family holidays (mostly birthdays) on New Year's Eve or other festivals. Our family members love each other. Those who come to us say that our family is very nice.

Questions:

- 1) Do you know all of your aunts and uncles? How many of them have you met? Which ones are older or younger than your father or mother?
- 2) Do you know all of your cousins? How many of them have you seen? Who are the new ones? When did you last see them? When will you get a chance to see all these relatives again?

Your Dad's and Mum's Job

- 3) Where does your father work?

Does he work in a factory?

In an office?

On a farm?

In a garage?

Does your Mum work at home?

- 4) How does your Dad get to work?

Does he go by bus? By train?

By car? (in a car pool)? Does he walk to work?

- 5) Does he work full-time or part-time?

- 6) How many hours a week does he work?

- 7) Does he ever work overtime?

- 8) Does he work days or nights?

- 9) Does he like his job?

- 10) How long has he been working there?

Vocabulary:

afterwards — потом, позже

anxious — озабоченный

babysitter — приходящая няня, остающаяся с детьми за плату

bake — печь, выпекать

baker — пекарь, булочник

baker's — булочная

carpool — автомобиль, на котором

взрослые по очереди возят в школу несколько детей

certainly — конечно

comfort — удобство, покой

My Friend

I have a lot of friends. Most of them are my former schoolmates. But my bosom friend is Lena. She is 16. Lena isn't very tall, but she is pretty in her own way. She has red curly hair and a turn-up nose. Lena wears spectacles and when spring comes there are plenty of freckles on her cheeks, forehead and nose. But all that doesn't make her plain or ugly. I like Lena because she is

well-bred, jolly and kind. She does well at school though she has an unbreakable rule: never to study at night no matter how many written reviews are coming in the morning.

She is also fond of reading plain books, and Lena sometimes thinks that one book isn't enough to read, she has two or three books going at once. My friend has a lot of books at home, and she buys them wherever she goes. She says that the books are of great help any time and they always must be at her hand. Her idea is that it's much easier to have a library of her own comprising lots of books than to try keeping everything in her head.

Lena goes in for sports and she is a member of our school basket-ball team. She is terribly quick and strong. It's a pleasure to watch her playing basket-ball: while others are hopping about in the air she always gets under their feet and grabs the ball.

I don't like people who are bored at everything and who never make the slightest effort to be pleasant. That's why my friend is Lena, the most amusing person in the world. She thinks everything is funny — even flunking an exam. Lena is a sunny soul by nature and always takes the slightest excuse to be amused. My friend has an imagination and her own style. Usually she writes nice compositions and once even won short-story contest that our school wallpaper holdsevery year.

Lena and me are good friends. We help each other a lot and try not to quarrel. But when sometimes it comes to quarreling we try to make it up at once.

Questions:

1. How old is Lena? 2. Does she wear spectacles? 3. Describe her appearance. 4. Does she do well at school? 5. What unbreakable rule has she? 6. What books is she fond of reading? 7. Does Lena go in for sports? .. Is she a member of the school basket-ball team? 8. Why is it a pleasure to watch her playing basket-ball? 9. Is Lena a sunny soul by nature? What makes you think so? 10. Has she an imagination? Prove it.

Vocabulary:

formerschool-mates — бывшие школьные друзья

bosomfriend — закадычный друг

to be pretty in one's own way — быть по-своему красивым

burn-up — курносый

freckles — веснушки

forehead — лоб

plain — некрасивый

to do well at school — хорошо учиться в школе

to be fond of — любить, нравится

plain books — художественные книги

to be of great help — быть очень полезным, нужным

to be at hand — быть под рукой

Our flat

When we speak about our flat we like to say "it is cosy", "it is comfortable". People must have a very cosy and comfortable flat. It is the place where they live, rest and sleep. They create a pleasant home with their own hands. Everyone in the family is responsible for its cleaning and keeping it in order.

My family and I live in a two-room apartment in a block of flats of five floors. Our flat is on the second floor. There is a bedroom, a living-room, a kitchen, a hall, and a bathroom in it. There is a balcony too. There are a lot of flowers there from early spring to late autumn.

My room is not large. There is a sofa, a writing-table and a chair, a wardrobe and a piano in the room. My room faces the North. It is very light.

The living-room is large. There is a dining-table with four chairs, a cupboard, two armchairs, a wall unit and a sofa. There is a T.V.-set, a tape-recorder and a record-player in the room. There are also several book-shelves there. The floor is covered with a beautiful carpet. There are two landscapes on the wall.

In the kitchen we have hot and cold running water, a gas stove; there is a table and chairs, a cupboard and shelves. Our home is very nice and hospitable!

Questions:

- 1) Do you live in an apartment/ flat?
- 2) How many rooms are there in your apartment/ flat?
- 3) How many apartments/ flats are there in your building?
- 4) What floor do you live on?
- 5) Does your building have an elevator / lift?
- 6) Does your building have a laundry room?
- 7) How large is the kitchen?
- 8) Does it have fire escapes?
- 9) Does your building have balconies?
- 10) Does it have a recreation room? What do people do there?

Vocabulary:

on the second floor-третий этаж

living-room-общая комната

kitchen-кухня

hall-прихожая

dining-table- обеденный стол

armchair- кресло

writing-table- письменный стол

sofa- диван

landscape- пейзаж

flower- цветок

My working day

On my working days I usually wake up at 7 o'clock in the morning. The alarm-clock rings and I get out of bed. I go to the bathroom. Then I do my morning exercises and get dressed. My breakfast is on the table. Mother has already made it. She gets up earlier and cooks breakfast. After it I leave for school. It takes me 10 minutes to get there. My classes start at half past eight. I usually have five or six lessons every day except Saturday and Sunday. By two o'clock I'm free. I go home and have dinner. Usually my friend gives me a call and we go for a walk. I like these walks, because we can chat about trifles and enjoy the weather. At these moments I feel happy and come home in good spirits. I am ready to do my homework. I spend about two hours on it. I know that about half an hour later my mother will come and I go to the kitchen to make the meal for my parents. They like it. After work they feel tired and the table on which their meal is ready makes them smile. I like such pleasant moments.

Certainly I do some other house work: cleaning, washing up, ironing and so on. In order to have a loving family, each person must do his part. We are friends and all decisions we make together. (What to buy, where to rest, what friends to invite on this or that occasion.)

My school-mates often come to our place. They like my parents. Sometimes they stay with us to have a cup of tea. We talk, watch TV and discuss some news. In the evenings and mornings we spend some time in the open air walking our dog Spotty.

Questions

- 1) When do you usually wake up on a week-day?
- 2) Who cooks your breakfast?
- 3) What work do you do in your flat?
- 4) Do you take a cold shower in the morning?
- 5) How do you travel to school?
- 6) Is your school far from your house?
- 7) What do you have for breakfast as a rule?
- 8) How long does it take you to get to school?
- 9) When do you have a break for lunch?
- 10) When do you get home from school?

Vocabulary:

alarm-clock —будильник
bathroom — ванная
certainly — конечно
chat — болтать
clean —прибирать
comfortable —уютный
cook — готовить
decision —решение
except —кроме
feeltired — чувствовать усталость

2 Семестр

THE GROZNY STATE OIL INSTITUTE by the academician M. D. Millionshikov

The Grozny State Oil Institute was founded in 1920 It's one of the oldest and leading educations institutions in Russia Federation. Before the war Grozny High Institute awarded by the Order of the *Labour* Red Banner of oil industry, named in the honour of academician M.D.Millionshikov. It was founded in 1920 on the base of oil College and situated in the centre of Lenin region of Grozny.

There were 9 faculties at the Oil Institute: the faculty of geological research, the faculty of oil trade, the faculty of oil-mechanics, the faculty of electrification and automation of the industrial processes, the building faculty. It had evening correspondence and preparatory departments.

During the war actions in Chechen Republic the main buildings of Oil Institute with all scientific research laboratories were destroyed.

Nowadays the Grozny State Oil Institute is restoring. There are five faculties at our Institute: the faculty of geological trade, the faculty of oil-mechanics, the faculty of automation and applied informatic and the building faculty. It has correspondence and preparatory departments and post-graduate course.

There are_____students on the day course and__ at the correspondence course. The academic year is divided into two terms: from September to January and from February to July. The students take examinations and tests at the end of each term. They attend lectures and practical hours and go through practical training at plants and other industrial enterprises and they get practical knowledge and experience necessary for their diploma papers.

The teaching staff contains more than ____skilled tutors candidates and doctors of science, assistants and professors.

A lot of students belong to students scientific groups. They take part in the research projects which their departments conduct.

Postgraduates carry out research in different fields of science and engineering.

More than 18000 specialists graduated from this well-known Institute. They work in the country and abroad, where the oil industry exists. Among the gradutors, there are four Heroes of the Soviet Union, five Heroes of Social Labour, more than 20 winners of the Lenin and State Premiums, more than 20 have the Rank of the honoured workers of the RSFSR and autonomous republics, more than 20 professors, 10 heads of the managements and so on.

Answer the following questions:

- 1 .What specialists does our Institute train?
2. What is the student body?
3. What do these buildings house?
4. How many buildings does our Institute have?
5. Who teaches at the Institute?
6. What does our diploma mean?
7. Who helps students master professional skills?
8. What part does our Institute play?

London

London is the capital of Great Britain, its political, economic and cultural centre. It's one of the largest cities in the world. Its population is more than 11 million people. London is situated on the river Thames. The city is very old and beautiful. It was founded more than two thousand years ago.

Traditionally London is divided into several parts: the City, the West End, the East End and Westminster. The City is the oldest part of London, its financial and business centre. The heart of the City is the Stock Exchange.

Westminster is the most important part of the capital. It's the administrative centre. The Houses of Parliament, the seat of the British Government, are there. It's a very beautiful building with two towers and a very big clock called Big Ben. Big Ben is really the bell which strikes every quarter of an hour. Opposite the Houses of Parliament is Westminster Abbey. It's a very beautiful church built over 900 years ago. The tombs of many great statesmen, scientists and writers are there.

To the west of Westminster is West End. Here we find most of the big shops, hotels, museums, art galleries, theatres and concert halls. Piccadilly Circus is the heart of London's West End. In the West End there are wide streets with beautiful houses and many parks, gardens and squares. To the east of Westminster is the East End, an industrial district of the capital. There are no parks or gardens in the East End and you can't see many fine houses there. Most of the plants and factories are situated there.

London has many places of interest. One of them is Buckingham Palace. It's the residence of the Queen. The English are proud of Trafalgar Square, which was named so in memory of the victory at the battle. There in 1805 the English fleet defeated the fleet of France and Spain. The last place of interest I should like to mention, is the British Museum, the biggest museum in London. The museum is famous for its library — one of the richest in the world.

All London's long-past history is told by its streets. There are many streets in London which are known all over the world. Among them Oxford Street, Downing Street and a lot of others can be mentioned. And tourists are usually attracted not only by the places of interest but by the streets too.

In conclusion I should say if you are lucky enough to find yourself in London some day you will have a lot to see and enjoy there.

Questions:

1. When was London founded?
2. Into which parts is London divided?
3. What is the heart of the City?
4. Do you know any places of interest in London?
5. All London's history is told by its streets, isn't it?

Vocabulary:

tower — башня	strike- ударять, бить
tomb — могила	to mention-упоминать, ссылаться
battle — битва	attract- привлекать, притягивать
in conclusion — в заключение	to be lucky- быть счастливым
	enjoy - наслаждаться

RUSSIAN FEDERATION (RUSSIA)

Russia is one of the largest countries in the world. It occupies about one-seventh of the world's total land mass. It is situated in Europe and Asia. Its total area is over 17 million square kilometers.

The country has many seas and oceans.

There are different types of climate on the territory of this country. It is very cold in the North even in summer. The central part of the country has a mild climate: winters are cold, springs and autumns are warm or cool. Summers are hot or warm. In the South the temperature is usually above zero all year round, even in winter. Summer is really hot and the climate is very favourable. The climate of Siberia is continental: summers are hot and dry while winters are very cold.

Some parts of the country are covered with hills and mountains.

There are many rivers in Russia. The longest rivers are Volga in Europe and the Yenisei and the Ob in Asia. The deepest lakes are the Baikal and the Ladoga.

The Russian Federation is very rich in mineral resources, such as oil, natural gas, coal, iron, gold and others.

Moscow is the capital of this country. It was founded in 1147. It is a nice city. There are many things to see in Moscow. For example, museums, art galleries, theatres, churches and monuments. The people of our country are proud of the Moscow Kremlin. There are also many other beautiful big cities in Russia.

The population of Russia is about 150 million. 83 per cent of population are Russians. 73 per cent of the population lives in cities.

Vocabulary:

1. occupy- занимать
2. climate- климат
3. temperature- температура
4. rich- богатый
5. per cent- процент
6. coal- уголь

7. iron- железо
8. lake-озеро
9. deep- глубокий
10. sights- достопримечательности

Questions:

1. Is the Russia Federation one of the largest countries in the world?
2. Where is the Russian Federation situated?
3. How many rivers are there in Russia?
4. What kind of mineral resources does Russia have?
5. What kind of lakes are there in our country?
6. What is the capital of our country?
7. Are there any sights in Moscow? What are they?

Создание времени. Касаясь речи 31

Moscow

Moscow, the capital of Russia, is one of the largest cities in the world. It stands on the bank of the Moskva River. About ten million people live in the city. Moscow is famous for its historical and architectural monuments that were built by the outstanding architects and sculptors: Kazakov, Bazhenov, Bove, Mikhailov, Martos, Opekushin and others.

The best starting point of the tour around the city is Red Square, the central and the most beautiful square in Moscow. It is the place of parades, meetings and demonstrations. Here one can see the Cathedral of St. Basil the Blessed, or St. Basil's cathedral, erected by architects Postnik and Barma to commemorate Russia's conquest of the Kazan Kingdom in 1552. It is a masterpiece of Russian architecture. Tourists can see the monuments to Minin and Pozharsky. It was designed by Ivan Martos in 1818 in memory of the Russian victory over the Polish invaders in 1612. The History Museum in Red Square is a magnificent building besides, it is one of the major scientific and educational institutions where we can follow the life of Russian people since ancient times.

The heart of Moscow is the Kremlin, a wonderful architectural ensemble with three magnificent cathedrals, the Bell Tower of Ivan the Great, palaces, fortress walls and 20 towers. On the five tops of the Kremlin towers one can see shining ruby stars. The clock that strikes every quarter of an hour is on the Spassky Tower. The Kremlin with golden domes and towers attracts everybody's attention and makes a strong impression on tourists and guests of the capital.

The Alexander Garden is situated near the Kremlin wall. In 1967 the Memorial architectural ensemble was set up over the Tomb of the Unknown Soldier. There are always a lot of flowers at the foot of the monument, especially on Victory Day.

Some skyscrapers decorate Moscow, including Moscow University where young people from different parts of our country and abroad study.

Moscow is a scientific and cultural centre where there are lots of institutes, universities, libraries, museums, technical schools, colleges and secondary schools. The city leads a varied cultural life. It has a lot of cinemas, clubs, concert halls, more than 40 drama and musical theatres, including the Bolshoi Theatre with its famous world ballet and opera, the Art Theatre, The Maly Theatre, the Vakhtangov Theatre and others.

Muscovites are proud of their museums: the Tretyakov Gallery, the Museum of Fine Arts named after A. S. Pushkin, the Kuskovo museum and Ostankino serfs Art Museum, Kolomenskoye, literary museums and art galleries.

At the Tretyakov Gallery one can see a lot of remarkable paintings by the outstanding Russian artists: Repin, Kramskoy, Ivanov, Serov, Perov, Phedotov, Levitan, Vasnetsov, Shishkin, Polenov and others. Crowds of people visit the Tretyakov Gallery admiring beautiful pictures.

At the Museum of Fine Arts there are masterpieces by the great European painters: Rubens, Van Gogh, Henri Matisse, Pablo Picasso, Paul Cezanne, Claude Monet, Rembrandt, Botticelli, John Constable and others.

Muscovites are fond of going in for sports. So, there are lots of stadiums, swimming-pools, sportsgrounds and courts. The biggest stadium is in Luzhniki. It is a green park with many sports facilities: a swimming-pool, a palace of sports, a skating-rink, tennis courts and other sportsgrounds.

The citizens of Moscow enjoy spending their weekends in parks, forests, gardens, for example in the Park of Culture and Rest, in Izmailovo, Sokolniki, Fili and others, where one can see amateur actors, films, go boating and ride on different attractions.

Certainly Moscow is worth seeing.

Vocabulary:

1-complex	-	комплекс
2. be proud of	-	гордиться
3. government	-	правительство
4. link-	соединять	
5. landscape	-	пейзаж
6. mention	-	упоминать
7. foreigner	-	иностранец
8. convenient	-	удобный

QUESTIONS

1. What is the capital of Russia?
2. Moscow is a port of five seas, isn't it?
3. Is Moscow a modern city?
4. Are there many plants in Moscow?
5. Do you like to visit the Tretyakov Gallery?
6. How often do you go to the museums?
7. What do you know about the State Moscow University?
8. There are many kinds of transport in Moscow, aren't there?
9. How many stations has our metro got?
10. Do you like to go by metro?

THE UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND

The United Kingdom is situated near the north-west coast of Europe between the Atlantic Ocean to the north and north-west and the North Sea to the east.

The U.K. includes Great Britain and Northern Ireland.

Great Britain, the largest island in Europe, contains England, Scotland and Wales.

The United Kingdom has an area of 94,249 square miles. The capital of the country is London. English is the official language.

The population of the U.K. is nearly 60 million. The population lives mostly in towns and cities and their suburbs. Four out of every five people live in towns. Over 46 million people live in England. Over 3 million- in Wales, a little over 5 million in Scotland, about 1.5. million- in

Northern Ireland. London's population is over 7 million. The British nation consists of the English, the Scots, the Welsh and the Irish. There are many people of all colours and races in the United Kingdom.

The climate of Great Britain is mild. It is not too hot in summer or too cold in winter. It often rains in England. Rain falls in summer and in winter, in autumn and in spring. Snow usually falls only in the North and West of the country. The surface of England and Ireland is flat but Scotland and Wales are mountainous.

Many parts of the country have beautiful villages. There are many rivers in Great Britain. The main river is the Thames. Many ships and barges go up and down the river. The longest river is the Severn. It is 350 kilometres long.

There are many universities, colleges, libraries, museums and theatres in the country. The most famous universities are Cambridge University and Oxford University.

The U.K. is a parliamentary monarchy. Согласование времён. Косвенная речь 33

The British Parliament consists of two Houses: the House of Lords and the House of Commons. The Prime Minister is the head of the government. The main political parties of Great Britain are the Labour Party, the Liberal Party and the Conservative Party.

The United Kingdom has various mineral resources. Coal and oil are the most important of them. The United Kingdom is one of the world's most industrialized countries. The main industrial centres are Sheffield, Birmingham, Cardiff, Manchester, Glasgow and Belfast.

Agriculture is an important sector in the economy of the country. The British grow wheat, fruit, vegetables and oats.

Vocabulary:

1. 1 mile = 1609 метров
2. mild — мягкий
3. flat — плоский, ровный
4. monarchy — монархия
5. oats — овес (обыкновенно р.)
6. the English — англичане
7. the Scots — шотландцы
8. the Welsh — уэльсцы, валлийцы
9. the Irish — ирландцы
10. barge — баржа

QUESTIONS

1. Where is Great Britain situated?
2. What is the area of the United Kingdom?
3. What is the capital of the country?
4. What is the official language in England?
5. How many rivers are there in Great Britain?
6. What does the British Parliament consist of?
7. What are the main political parties in Great Britain?
8. What are the main industrial centres in Great Britain?
9. Name the largest cities of the country.
10. How many do people live United Kingdom of Great Britain and Northern Ireland?

MY NATIVE CITY

Grozny is the industrial and cultural centre and capital of the Chechen Republic. It was founded first as fortress on either side of the Sunzha River in 1818. 20 years ago it was a prosperous city.

Elder generation remembers its green parks and squares, wide streets and avenues, magnificent and multistoried dwellings, fine palaces, theatres, cinemas, museums. In different parts of the city there were monuments to famous Russian writers and poets. But what the people were proud of was the industry of Grozny. Grozny was famous for its oil and chemical industry. At night one could see in the sea of lights there were lights of its numerous plants the production of which has been exported to many countries abroad. Higher educational institutes that are Oil, Pedagogical and University trained specialists for different aspects of the life of our republic. One could hardly recognize Grozny after subsequent wars. The city was greatly damaged by the war actions. Ruins, ruins and ~~ruins were everywhere. It was necessary to rebuild everything destroyed during the wars.~~ The face of city was rapidly changing. The whole districts have already reconstructed. A lot of new modern buildings, schools, hospitals have been built in different parts of the city. In the years to come Grozny will grow and develop. You will not find single-storied houses blocks buildings of concrete, steel and glass will line the streets of the capital. Its streets will be covered with asphalt, green parks and squares will be laid out. Grozny of tomorrow will grow into a garden city. In the near future it will become one of the most beautiful cities in the North Caucasus. I like my city and I am proud to be citizen of my Republic.

Vocabulary:

in the years to come-	в последующие годы
to lay out(laid, laid)-	разбивать (парки, скверы)
magnificent-	великолепный
dwelling -	дом
avenue-	аллея
rapidly-	быстро
fortress-	крепость
prosperous-	процветающий
to damage-	повреждать, наносить ущерб
multistoried-	многоэтажный

Questions:

1. Is Grozny the industrial and cultural centre of the Chechen Republic?
2. Where is the Chechen Republic situated?

3. How many rivers are there in the Chechen Republic?
4. What kind of mineral resources does the Chechen Republic have?
5. What kind of lakes are there in our Republic?
6. What is the capital of the Chechen Republic?
7. Are there any sights in Grosny? What are they?

3 Семестр

British science and scientists

British contribution to science includes many great discoveries linked with famous names - Sir Isaac Newton (theory of gravitation), Robert Boyle ("the father of modern chemistry"), Michael Faraday (whose discoveries gave rise to the electrical industry), and Henry Cavendish (properties of hydrogen). In the last century -J.J. Thomson, Lord Rutherford and Sir James Chadwick (basic work on nuclear science), Gowland Hopkins (the existence of vitamins¹), Sir William Bragg (X-ray analysis), and many others.

Medicine owes² much to such pioneers as William Harvey (circulation of the blood), Edward Jenner (vaccination), Joseph Lister (antiseptics), Sir Ronald Ross (who proved the relation between malaria and mosquitoes). British advances in medicine include penicillin and other antibiotics, heart-lung machines³, a new anti-viral agent⁴, interferon of great potential value, and many other important development in the treatment of disease.

The first pedal cycle was built by a Scotsman, Kirkpatrick Macmillan, in 1839. Today Britain is the world's biggest exporter of cycles.

The first thermionic valve⁵ was patented in England in 1904 by Sir Ambrose Fleming, who could have foreseen few of the consequences of his invention - radio broadcasting, television, radar navigational aids and communications satellites.

The British discovery of the multicavity magnetron⁶ in 1941 marked the beginning of modern radar, which played a major part in the Second World War. Today over half the world's shipping carries British radar equipment.

Since 1945 there have been over 30 British scientists who have received international recognition for their work by gaining Nobel awards. There are more than 200 learned scientific societies in Britain.

Vocabulary:

bitamin - витамин В

toowe - быть должным, быть обязанным

heart-lungmachines - приборы (аппараты) искусственного сердца и легких

an ti- viral agent -антивирусное вещество

thermionicvalve - электронная лампа высокой чувствительности

(термической обработки)

multicavitymagnetron - магнетрон, обеспечивающий очень большой выход энергии

consequence-последствие

satellite-сопровождающее и обслуживающее лицо

broadcasting-радиовещание, телевидение

События и времена. Довольная речь

Questions:

1. What includes many great discoveries linked with famous names?
2. Whom does medicine owe?
3. What do British advances include in medicine?
4. Whom was the first pedal cycle built by?
5. When was the first pedal cycle built by Kirkpatrick Macmillan?

THEY ARE BRITAIN'S PRIDE

CHRISTOPHER WREN (1632-1723)

Unfortunately it is not much known about the first years of Christopher Wren's life and about the family he was born in. But it goes without saying that it was his mother, or father, or both who helped Christopher to be interested in many things and become industrious.

Christopher Wren was many-sided specialist. He was a mathematician, an astronomer and, above all, he was a man of science and an inventor. When Wren was at the age 28, he was a Professor and taught astronomy at Oxford.

Most of all Christopher Wren is known as an eminent architect. He revealed his talent of an architect after the Great Fire of London (1666). Wren invented new ways of working with traditional English building material, brick in particular, which he used while rebuilding the churches of London, burnt down in the Great Fire.

Wren wanted to change the face of the capital. He prepared a plan for restoration of London, and the City in particular. It was difficult to realize himself in full while restoring the city from ruins and ashes.

Wren built anew more than fifty London's churches, in particular St. Michael's, St. Bride's and St. Mary-le-Bow, to replace those destroyed. Wren's main project was erecting anew St. Paul's Cathedral. The building of Wren's masterpiece, St. Paul's Cathedral, began in 1675 and lasted for more than twenty years, till 1720, when Wren was 88 years old.

Christopher Wren's other buildings include Royal Exchange, Marlborough House, Greenwich Hospital, Chelsea Hospital, the Royal Naval College and parts of Hampton Court.

Christopher Wren was made a knight in 1673, fifty years after his death.

Sir Christopher Wren was buried in St. Paul's Cathedral that he had built. The epitaph inscribed on his grave reads, "For his monument, just look around you."

Questions:

1. What can you tell about Wren's the first years?

Environmental Pollution

People have always polluted their surroundings. But until now pollution was not such a serious problem. People lived in uncrowded rural areas and did not have pollution — causing machines. With the development of crowded industrial cities which put huge amounts of pollutants into small areas, the problem has become more important. Automobiles and other new inventions make pollution steadily worse. Since the late 1960's people have become alarmed with the danger of pollution.

Air, water, and soil are necessary for existence of all living things. But polluted air can cause illness, and even death. Polluted water kills fish and other marine life. On polluted soil, food can not be grown. In addition environmental pollution spoils the natural beauty of our planet.

Pollution is as complicated as serious problem. Automobiles are polluting the air but they provide transportation for the people. Factories pollute the air and the water but they provide jobs for people and produce necessary goods. Fertilizers and pesticides are important for growing crops but they can ruin soil.

Thus, people would have to stop using many useful things if they wanted to end pollution immediately. Most people do not want that of course. But pollution can be reduced gradually. Scientists and engineers can find the ways to reduce pollution from automobiles and factories. Government can pass the laws that would make enterprises take measures for reducing of pollution. Individuals and groups of people can work together to persuade enterprises to stop polluting activities.

Questions

1. Why wasn't pollution such as a serious problem earlier?
2. When have people become alarmed with the danger of pollution?
3. What can environmental pollution cause?
4. Why is pollution a complicated problem?
5. Can pollution be stopped immediately?
6. What can government and individuals do to reduce pollution?

Vocabulary:

environment pollution — загрязнение окружающей среды

uncrowded — слабонаселенный

rural — сельскохозяйственный

pollution-causing — вызывающий загрязнение

crowded — густонаселенный

pollutants — отходы

invention — изображение

soil — грунт, земля

existence — существование

goods — товары

Sport

A lot of people never exercise. They often eat the wrong food as well. These people become unhealthy.

In our family all of us are careful about our food and exercise a lot. My dad and brother run five kilometres every day. They are very healthy. They like swimming and running. My father doesn't drink any alcohol and he never smokes. My Mum and I do aerobics at the weekend. I always eat some fruit for breakfast: an apple and an orange. I eat a lot of vegetables, but I never eat any sugar. It's very bad for teeth.

My brother does a lot of sports: swimming, cycling, yoga and jogging. He likes swimming, because it is good for the back. Cycling is good for the legs, and it's relaxing. Yoga is good for breathing. It's also very relaxing.

Jogging is good for losing weight, and also very good for breathing. It's very good for the heart, too. I like tennis very much. Tennis is fun, and very exciting. It's very good for arms and legs. I like it a lot.

Questions:

- 1) Do you do a lot of sports?
- 2) How many sports do you do?
- 3) And what are they?
- 4) Why do you like cycling?
- 5) What kinds of sport are most popular among the young people in your country?
- 6) Do you like physical training classes at school? If "yes": What kind of activity do you prefer? If "no": Why not?
- 7) What kinds of sport competitions are held in your school?
- 8) Are there any school champions in your class?
- 9) What sport does she/he do?

10) Is there any difference between your PT lessons in winter and in autumn? Say in detail.

Vocabulary:

breathing —дыхание

careful —заботливый

exercise —заниматься спортом

health — здоровье

jogging — бег трусцой

relax — расслабляться

smoke — курить

unhealthy — нездоровый

wealth — богатство

Spare time

Every day I go to school. I get up early, do homework, have piano lessons twice a week.

But on weekends I like to do something different. I like to relax. I watch T. V. or videos. If it rains, I prefer indoor activities: to read books or newspapers, to play chess, draughts or table-tennis, to practice woodcraft, to play records, to write some letters, to draw, to clean the house.

In winter I like to watch Winter Olympics on T.V. I like to watch ski jumping, hockey and figure skating.

As for my sister she likes to knit and sew. She takes an aerobics class on Sundays.

In spring and summer I prefer outdoor activities: to do some gardening, to ride a bike, to go roller skating, to play volleyball and badminton. I like to go swimming and I go deep-sea diving. I like to go boating too. I go fishing and do a lot of photography. Of all outdoor games I prefer tennis. Playing tennis relaxes me. I'm not a good tennis player.

In autumn I like to go to the cinema, to the theatre, to the concerts, to the library and art exhibitions.

In winter I go skiing or skating. I like to play ice hockey. My sister likes figure skating.

Questions

- 1) What do you like to do on weekends?
- 2) What are you going to do this weekend?
- 3) Are you a good swimmer?
- 4) What are you doing next Sunday?

- 5) What will you do if it rains?
- 6) What sport do you like to do on vacation?
- 7) Can you play it well?
- 8) What does your sister like to do on weekends?
- 9) How much television do you watch every week?
- 10) What were you doing last night?

Vocabulary:

Согласование времен. Косвенная речь **40**

- artexhibition — художественная выставка
- basketball — баскетбол
- different — различный
- dive — нырять
- draughts — шашки
- draw — рисовать карандашами
- figure skating — фигурное катание
- football — футбол
- go cycling = to ride a bike — кататься на велосипеде
- gorollerskating — кататься на роликовых коньках

My future profession.

Geodesy is a professional engineering discipline that deals with the design, construction and maintenance of the physical and naturally built environment, including works such as bridges, roads, canals, dams and buildings. They must consider many factors in their designs, from the costs to making sure the structure will stay intact during bad weather. This is one of the oldest types of engineering.

Many geodesy manage people and projects. Any engineer may oversee a construction site or be a city engineer. Others may work in design, construction, research, and teaching. There are many specialties within civil engineering, such as structural, construction, environment, and transportation.

The engineers usually work in areas that are industry and business centers. Engineers should be creative, curious, analytical, and detail-oriented. They should be able to work as part of a team. People skills are important. This is because engineers often work with people in a wide range of fields.

Questions:

1. What is civil engineering?
2. What factors must they consider?
3. Is this one of the oldest types of engineering?
4. What specialties are there within civil engineering?
5. Where do civil engineers usually work?

Vocabulary:

Civil engineering-гражданское строительство

discipline-дисциплина

bridges-мост

Согласование времен. Косвенная речь **41**

road-дорога

canal-канал

dam-дамба, платина

project-проект, план

creative-творческий, созидательный

curious-любопытный

ТЕМЫ РЕФЕРАТОВ

1.

Тексты по страноведению
ClimateinEngland
Great Britain
Newspapers in Great Britain
The Government of Great Britain
Higher and Further Education in Britain

2.Критерии оценки

Регламентом БРС предусмотрено всего 15 баллов за самостоятельную работу студента. Критерии оценки разработаны, исходя из возможности защиты студентом до пяти рефератов (по 3 балла).

- 0 баллов выставляется студенту, если подготовлен некачественный доклад: тема не раскрыта, в изложении доклада отсутствует четкая структура, логическая последовательность.

- **1- балл выставляется студенту, если** подготовлен некачественный доклад: тема раскрыта, однако в изложении доклада отсутствует четкая структура отражающая сущность раскрываемой темы

- **2 балла выставляется студенту, если** подготовлен качественный доклад: тема хорошо раскрыта, в изложении доклада прослеживается четкая структура, логическая последовательность, отражающая сущность раскрываемой темы. Однако студент не осознает связь данного понятия с другими объектами дисциплины.

- **3 балла выставляется студенту, если** подготовлен качественный доклад: тема хорошо раскрыта, в изложении доклада прослеживается четкая структура логическая последовательность. ~~Соблюдение в работе~~ ~~использует~~ ~~терминами,~~ ~~демонстрирует~~ ~~авторскую позицию.~~ ~~Способен ответить на дополнительные вопросы по теме доклада (1-2 вопроса).~~

Экзаменационные тексты

GEODESY

The scientific objective of geodesy is to determine the size and shape of the Earth. The practical role of geodesy is to provide a network of accurately surveyed points on the Earth's surface, the vertical elevations and geographic positions of which are precisely known and, in turn, may be incorporated in maps. When two geographic coordinates of a control point on the Earth's surface, its latitude and longitude, are known as well as its elevation above sea level, the location of that point is known with accuracy within the limits of error involved in the surveying processes. In mapping large areas, such as a whole state or country, the irregularities in the curvature of the Earth must be considered. A network of precisely surveyed control points provides a skeleton to which other surveys may be tied to provide progressively finer networks of more closely spaced points. The resulting networks of points have many uses, including anchor points or bench marks for surveys of highways and other civil features. A major use of control points is to provide reference points to which the contour lines and other features of topographic maps are tied. Most topographic maps are made using photogrammetric techniques and aerial photographs. The Earth's figure is that of a surface called the geoid, which over the Earth is the average sea level at each location; under the continents the geoid is an imaginary continuation of sea level. The geoid is not a uniform spheroid, however, because of the existence of irregularities in the attraction of gravity from place to place on the Earth's surface. These irregularities of the geoid would bring about serious errors in the surveyed location of control points if astronomical methods, which involve use of the local horizon, were used solely in determining locations. Because of these irregularities, the reference surface used in geodesy is that of a regular mathematical surface, an ellipsoid of revolution that fits the geoid as closely as possible. This reference ellipsoid is below the geoid in some places and above it in the others. Over the oceans, mean sea level defines the geoid surface, but over the land areas the geoid is an imaginary sea-level surface. Today perturbations in the motions of artificial satellites are used to define the global geoid and gravity pattern with a high degree of accuracy. Geodetic satellites are positioned at a height of 700-800 kilometers above the Earth. Simultaneous range observations from several laser stations fix the position of a satellite, and radar altimeters measure directly its height over the oceans. Results show that the geoid is irregular; in places its surface is up to 100

metres higher than the ideal reference ellipsoid and elsewhere it is as much as 100 metres below it. The most likely explanation for this height 4 variation is that the gravity (and density) anomalies are related to mantle convection and temperature differences at depth. An important observation that confirms this interpretation is that there is a close correlation between the gravity anomalies and the surface expression of the Earth's plate boundaries. This also strengthens the idea that the ultimate driving force of tectonic plate is a large-scale circulation of the mantle. A similar satellite ranging technique is also used to determine the drift rates of continents. Repeated measurements of laser light travel times between ground stations and satellites permit the relative movement of different control blocks to be calculated.

Notes: 1. The curvature of the Earth – кривизна Земли; 2. Benchmark – опорная отметка уровня; 3. Civil features – ^{Согласование времен. Косвенная речь} строительные работы; 4. Reference point – базовая точка, начальная точка отсчёта; 5. Perturbation – отклонение; 6. Artificial satellite - искусственный спутник; 7. High degree of accuracy – высокая степень точности; 8. Reference ellipsoid - референц-эллипсоид.

HISTORY OF SURVEYING

Surveying can be determined as a means of making relatively large-scale, accurate measurements of the Earth's surfaces. It includes the determination of the measurement data, the reduction and interpretation of the data to usable form, and, conversely, the establishment of relative position and size according to given measurement requirements. Thus, surveying has two similar but opposite functions: 1) the determination of existing relative horizontal and vertical position, such as that used for the process of mapping, and 2) the establishment of marks to control construction or to indicate land boundaries. Surveying has been an essential element in the development of the human environment for so many centuries that its importance is often forgotten. It is an imperative requirement in the planning and execution of nearly every form of construction. Surveying was essential at the dawn of history, and some of the most significant scientific discoveries could never have been implemented were it not for the contribution of surveying. Its principal modern uses are in the fields of transportation, building, apportionment of land, and communications. It is quite probable that surveying had its origin in ancient Egypt. The Great Pyramid of Khufu at Giza was built about 2700 BC, 755 feet (230.5 metres) long and 481 feet (147 metres) high. Its nearly perfect squareness and north-south orientation affirm the ancient Egyptians' command of surveying. Evidence of some form of boundary surveying as early as 1400 BC has been found in the fertile valleys and plains of the Tigris, Euphrates, and Nile rivers. Clay tablets of the Sumerians show records of land measurement and plans of cities and nearby agricultural areas. Boundary stones marking land plots have been preserved. There is a representation of land measurement on the wall of a tomb at Thebes (1400 BC) showing head and rear chainmen measuring a grainfield with what appears to be a rope with knots or marks at uniform intervals. There is some evidence that in addition to a marked cord, wooden rods were used by the Egyptians for distance measurement. There is no record of any angle-measuring instruments, but there was a level consisting of a vertical wooden A-frame with a plumb bob supported at the peak of the A so that its cord hung past an indicator, or index, on the horizontal bar. The index could be properly placed by standing the device on two supports at approximately the same elevation, marking the position of the cord, reversing the A, and making a similar mark.

Halfway between the two marks would be the correct place for the index. Thus, with their simple devices, the ancient Egyptians were able to measure land areas, replace property corners lost when the 6 by hand it automatically dropped a pebble into a container at each revolution; giving a measure of the distance traveled. It was, in effect, the first odometer. The water level consisted of either a trough or a tube turned upward at the ends and filled with water. At each end there was a sight made of crossed horizontal and vertical slits. When these were lined up just above the water level, the sights determined a level line accurate enough to establish the grades of the Roman aqueducts. In laying out their great road system, the Romans are said to have used the plane table. It consists of a drawing board mounted on a tripod or other stable support and of a straightedge – usually with sights for accurate aim (the alidade) to the objects to be mapped – along which lines are drawn. It was the first device capable of recording or establishing angles. Later adaptations of the plane table had magnetic compasses attached. Plane tables were in use in Europe in the 16th century, and the principle of graphic triangulation and intersection was practiced by surveyors. In 1615 Willebrord Snell, a Dutch mathematician, measured an arc of meridian by instrumental triangulation. In 1620 the English mathematician Edmund Gunter developed a surveying chain, which was superseded only by the steel tape beginning in the late 19th century. The study of astronomy resulted in the development of angle-reading devices that were based on arcs of large radii, making such instruments too large for field use. With the publication of logarithmic tables in 1620, portable angle-measuring instruments came into use. They were called topographic instruments, or theodolites. They included pivoted arms for sighting and could be used for measuring both horizontal and vertical angles. Magnetic compasses may have been included on some. The vernier, an auxiliary scale permitting more accurate readings (1631), the micrometer microscope (1638), telescopic sights (1669), and spirit levels (about 1700) were all incorporated in theodolites by about 1720. Stadia hairs were first applied by James Watt in 1771. The development of the circle-dividing engine about 1775, a device for dividing a circle into degrees with great accuracy, brought one of the greatest advances in surveying methods, as it enabled angle measurements to be made with portable instruments far more accurately than had previously been possible. Modern surveying can be said to have begun by the late 18th century. One of the most notable early feats of surveyors was the measurement in the 1790s of the meridian from Barcelona, Spain, to Dunkirk, France, by two French engineers, Jean Delambre and Pierre Méchain, to establish the basic unit for the metric system of measurement. Many improvements and refinements have been incorporated in all the basic surveying instruments. These have resulted in increased accuracy and speed of operations and opened up possibilities for improved methods in the field. In addition to modification of existing instruments, two revolutionary mapping and surveying changes were introduced: photogrammetry, or mapping from aerial photographs (about 1920), and electronic distance measurement, including the adoption of the laser for this purpose as well as for alignment (in the 1960s). Important technological developments starting in the late 20th century include the use of satellites as reference points for geodetic surveys and electronic computers to speed the processing and recording of survey data.

Notes: 1. Measurement data – данные измерений; 2. Apportionment of land – распределение земель; 3. Boundary surveying – межевание земель; 4. Land plot – земельный участок; 5. Nautical surveying – гидрографическая съёмка; 6. Circumference – окружность; 7. Odometer – одометр, измерительное колесо; 8. Plane table – мензула; 9.

Vernier – верньер; 10. Telescopic sight – визирная труба; 11. Spirit level – спиртовой уровень; 12. Stadia hairs – дальномерные нити; 13. Alignment – визирование.

THE SIMPLEST FORM OF HORIZONTAL CONTROL

The simplest form of horizontal control is the traverse, which consists of a series of marked stations connected by measured courses and the measured angles between them. When such a series of distances and angles returns to its point of beginning or begins and ends at stations of superior (more accurate) control, it can be checked and the small errors of measurement adjusted for mathematical consistency. By assuming or measuring 9 parallelograms. If the system is connected with previously determined stations, the new system must fit the established measurements. When the survey encompasses an area large enough for the Earth's curvature to be a factor, an imaginary mathematical representation of the Earth must be employed as a reference surface. A level surface at mean sea level is considered to represent the Earth's size and shape, and this is called the geoid. Because of gravity anomalies, the geoid is irregular; however, it is very nearly the surface generated by an ellipse rotating on its minor axis – i.e. an ellipsoid slightly flattened at the ends, or oblate. Such a figure is called a spheroid. Several have been computed by various authorities; the one usually used as a reference surface by English-speaking nations is (Alexander Ross) Clarke's Spheroid of 1866. This oblate spheroid has a polar diameter about 27 miles (43 kilometers) less than its diameter at the Equator. Because the directions of gravity converge toward the geoid, a length of the Earth's surface measured above the geoid must be reduced to its sea-level equivalent – i.e. to that of the geoid. These lengths are assumed to be the distances, measured on the spheroid, between the extended lines of gravity down to the spheroid from the ends of the measured lengths on the actual surface of the Earth. The positions of the survey stations on the Earth's surface are given in spherical coordinates. Bench marks, or marked points on the Earth's surface, connected by precise leveling constitute the vertical controls of surveying. The elevations of bench marks are given in terms of their heights above a selected level surface called a datum. In large-level surveys the usual datum is the geoid. The elevation taken as zero for the reference datum is the height of mean sea level determined by a series of observations at various points along the seashore taken continuously for a period of 19 years or more. Because mean sea level is not quite the same as the geoid, probably because of ocean currents, in adjusting the level grid for the United States and Canada all heights determined for mean sea level have been held at zero elevation. Because the level surfaces, determined by leveling, are distorted slightly in the area toward the Earth's poles (because of the reduction in centrifugal force and the increase in the force of gravity at higher latitudes), the distances between the surfaces and the geoid do not exactly represent the surface's heights from the geoid. To correct these distortions, orthometric corrections must be applied to long lines of levels at high altitudes that have a north-south trend. Trigonometric leveling often is necessary where accurate elevations are not available or when the elevations of inaccessible points must be determined. From two points of known position and elevation, the horizontal position of the unknown point is found by triangulation, and the vertical angles from 10 the known points are measured. The differences in elevation from each of the known points to the unknown point can be computed trigonometrically. The National Ocean Service in recent years has hoped to increase the density of horizontal control to the extent that no location in the United States will be farther than 50 miles (80 kilometres) from a primary point, and advances anticipated in analytic phototriangulation suggest that the envisioned density of control may soon

suffice insofar as topographic mapping is concerned. Existing densities of control in Britain and much of western Europe are already adequate for mapping and cadastral surveys.

Notes: 1. Adjacent triangle – примыкающий треугольник; 2. Oblate – сжатый; 3. Spherical coordinates – сферические координаты; 4. Marked point – опорная точка; 5. Distortion – искажение; 6. Orthometric corrections – ортометрические поправки; 7. Trigonometric leveling – тригонометрическое нивелирование; 8. National Ocean Service (NOS) – Национальная океаническая служба США; 9. Analytic phototriangulation – аналитическая фототриангуляция.

MODERN SURVEYING GLOBAL POSITIONING

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The techniques used to establish the positions of reference points within an area to be mapped are similar to those used in navigation. In surveying, however, greater accuracy is required, and this is attainable because the observer and the instrument are stationary on the ground instead of in a ship or aircraft that is not only moving but also subject to accelerations, which make it impossible to use a spirit level for accurate measurements of star elevations. The technique of locating oneself by observations of celestial objects is rapidly going out of date. In practicing it, the surveyor uses a theodolite with a spirit level to measure accurately the elevations of the Sun at different times of the day or of several known stars in different directions. Each observation defines a line on the Earth's surface on which the observer must be located; several such lines give a fix, the accuracy of which is indicated by how closely these lines meet in a point. For longitude it is necessary also to record the Greenwich Mean Time of each observation. This has been obtained since 1884 by using an accurate chronometer that is checked at least once a day against time signals transmitted telegraphically over land lines and submarine cables or broadcast by radio. 11 A more recent procedure for global positioning relies on satellites, whose locations at any instant are known precisely because they are being continuously observed from a series of stations in all parts of the world. The coordinates of these stations were established by very large scale triangulation based on a combination of radar observations of distances and measurements of the directions of special balloons or flashing satellites, obtained by photographing them at known instants of time against the background of the fixed stars. The principal method of using satellites for accurate positioning is based on an application of the Doppler effect. A radio signal is transmitted at a steady frequency by the satellite, but a stationary observer detects a higher frequency as the satellite approaches and a lower one as it recedes. The speed of the frequency drop depends on the distance of the observer from the satellite's track, so a determination of this speed provides a measure of that distance. At the instant of the satellite's closest approach, the observed frequency is the same as that transmitted, so at that time the observer must be located somewhere along the line at right angles to the satellite's track. Since this track over the Earth's surface is accurately known at all times, these data define the observer's position.

Notes: 1. Greenwich Mean Time – среднее время по Гринвичу; 2. Flashing satellite – геодезический спутник с импульсным источником света; 3. Doppler effect – доплеровский эффект.

MODERN SURVEYING ESTABLISHING THE FRAMEWORK

Most surveying frameworks are erected by measuring the angles and the lengths of the sides of a chain of triangles connecting the points fixed by global positioning. The locations of ground features are then determined in relation to these triangles by less accurate and therefore cheaper methods. Establishing the framework ensures that detail surveys conducted at different times or by different surveyors fit together without overlaps or gaps. For centuries the corners of these triangles have been located on hilltops, each visible from at least two others, at which the angles between the lines joining them are measured; this process is called triangulation. The lengths of one or two of these lines, called bases, are measured with great care; all the other lengths are derived by trigonometric calculations from them and the angles. Rapid checks on the accuracy are provided by measuring all three angles of each triangle, which must add up to 180 degrees.

12 In small flat areas, working at large scales, it may be easier to measure the lengths of all the sides, using a tape or a chain, rather than the angles between them; this procedure, called trilateration, was impractical over large or hilly areas until the invention of electromagnetic distance measurement (EDM) in the mid-20th century. This procedure has made it possible to measure distances as accurately and easily as angles, by electronically timing the passage of radiation over the distance to be measured; microwaves, which penetrate atmospheric haze, are used for long distances and light or infrared radiation for short ones. In the devices used for EDM, the radiation is either light (generated by a laser or an electric lamp) or an ultrahigh-frequency radio beam. The light beam requires a clear line of sight; the radio beam can penetrate fog, haze, heavy rain, dust, sandstorms, and some foliage. Both types have a transmitter-receiver at one survey station. At the remote station the light type contains a set of corner mirrors; the high-frequency type incorporates a retransmitter (requiring an operator) identical to the transmitter-receiver at the original station. A corner mirror has the shape of the inside of a corner of a cube; it returns light toward the source from whatever angle it is received, within reasonable limits. A retransmitter must be aimed at the transmitter-receiver. In both types of instrument, the distance is determined by the length of time it takes the radio or light beam to travel to the target and back. The elapsed time is determined by the shift in phase of a modulating signal superimposed on the carrier beam. Electronic circuitry detects this phase shift and converts it to units of time; the use of more than one modulating frequency eliminates ambiguities that could arise if only a single frequency had been employed. EDM has greatly simplified an alternative technique, called traversing, for establishing a framework. In traversing, the surveyor measures a succession of distances and the angles between them, usually along a traveled route or a stream. Before EDM was available, traversing was used only in flat or forested areas where triangulation was impossible. Measuring all the distances by tape or chain was tedious and slow, particularly if great accuracy was required, and no check was obtainable until the traverse closed, either on itself or between two points already fixed by triangulation or by astronomical observations. In both triangulation and traversing, the slope of each measured line must be allowed for so that the map can be reduced to the horizontal and referred to sea level. A measuring tape may be stretched along the ground or suspended between tripods; in precise work corrections must be applied for the sag, for tension, and for temperature if these differ from the values at which the tape was standardized. In work of the highest order, known as geodetic, the errors must be kept to one millimetre in a kilometre, that is, one part in 1,000,000.

Notes: 1. Framework – сеть опорных пунктов; 2. Electromagnetic distance measurement (EDM) – измерение расстояний радиодальномером; 3. Electronic circuitry – электронная схемотехника; 4. Frequency – частота; 5. Sag – прогиб.

MODERN SURVEYING THE THEODOLITE

Though for sketch maps the compass or graphic techniques are acceptable for measuring angles, only the theodolite can assure the accuracy required in the framework needed for precise mapping. The theodolite consists of a telescope pivoted around horizontal and vertical axes so that it can measure both horizontal and vertical angles. These angles are read from circles graduated in degrees and smaller intervals of 10 or 20 minutes. The exact position of the index mark (showing the direction of the line of sight) between two of these graduations is measured on both sides of the circle with the aid of a vernier or a micrometer. The accuracy in modern first-order or geodetic instruments, with five-inch glass circles, is approximately one second of arc. With such an instrument a sideways movement of the target of one centimetre can be detected at a distance of two kilometres. ^{Согласование времен. Косвенная речь 48} By repeating the measurement as many as 16 times and averaging the results, horizontal angles can be measured more closely; in geodetic surveying, measurements of all three angles of a triangle are expected to give a sum of 180 degrees within one second of arc. In the most precise long-distance work, signaling lamps or heliographs reflecting the Sun are used as targets for the theodolite. For less demanding work and work over shorter distances, smaller theodolites with simpler reading systems can be used; targets are commonly striped poles or ranging rods held vertical by an assistant. An extensive set of these measurements establishes a network of points both on the map, where their positions are plotted by their coordinates, and on the ground, where they are marked by pillars, concrete ground marks, bolts let into the pavement, or wooden pegs of varying degrees of cost and permanence, depending on the importance and accuracy of the framework and the maps to be based on it. Once this framework has been established, the surveyor proceeds to the detail mapping, starting from these ground marks and knowing that their accuracy ensures that the data obtained will fit precisely with similar details obtained elsewhere in the framework.

Notes: 1. Sketch map – обзорная карта; 2. Heliograph – радиогелиограф; 3. Ranging rod – дальномерная рейка.

MODERN SURVEYING TOTAL STATION

Total station or TST (total station theodolite) is an electronic/optical instrument used in modern surveying and building construction. The total station is an electronic theodolite (transit) integrated with an electronic distance meter (EDM) to read slope distances from the instrument to a particular point. The primary function of surveying instruments is to measure distances, angles and heights. The total station employs the electro-optical distance metering method, emitting laser beams to a target and detecting light reflected off it. It takes measurements by calculating the deviation of the wavelength of the reflected light. Total stations are able to measure distances to an accuracy of 2-3 millimeters per kilometer, and angles to 1-second accuracy. Surveying instruments measure angles using a built-in encoder. The encoder is a device that measures the rotation angle and number of rotations of a built-in motor as digital data. To measure the angle to a target point, the system creates a radial pattern comprising 16,200 spokes at equal distance on a glass disc and irradiates light with an LED diode. The encoder detects the rotation angle of the motor by reading changes in the intensity of the projected light. This way, the angle to the target is detected with a resolution down to a one-second angle. There are two methods of measuring distance: the prism method, which uses a reflective prism at the target measurement point, and the non-prism, or reflectorless, method that

does not use a reflective prism. With the prism method, a laser is beamed at a reflective prism (also called a mirror) placed at the measurement point, and the distance is measured by the time it takes for light to be reflected back from the prism. Though this method is more accurate than the reflectorless method, it requires the pacing of a reflective prism at the measurement point, making it difficult to measure distances to high locations, diagonal surfaces, or inaccessible locations. With the reflectorless method, it is possible to survey areas from a distant location. Even areas of possible danger such as disaster areas (e.g. landslides) can safely and efficiently be surveyed with this method, which has the additional advantage of requiring less labour and time (there is no need for a second team to handle the prism at the target point). When surveying roads, for example, traffic restrictions need to be put into place if reflective prisms are used. This is not the case with the reflectorless method. The decision to use the prism or reflectorless method is made according to conditions at the survey site.

Notes: 1. Total station – тахеометр; 2. Slope distance – расстояние по наклону; 3. Reflected light – отражённый свет; 4. Built-in encoder – встроенный датчик; 5. Reflective prism – отражательная призма; 6. Pacing – измерение расстояния шагами.

MODERN SURVEYING DETAIL SURVEYING

The actual depiction of the features to be shown on the map can be performed either on the ground or, since the invention of photography, aviation, and rocketry, by interpretation of aerial photographs and satellite images. On the ground the framework is dissected into even smaller areas as the surveyor moves from one point to another, fixing further points on the features from each position by combinations of angle and distance measurement and finally sketching the features between them freehand. In complicated terrain this operation can be slow and inaccurate, as can be seen by comparing maps made on the ground with these made subsequently from aerial photographs. Ground survey still has to be used, however, for some purposes; for example, in areas where aerial photographs are hard to get; under the canopy of a forest, where the shape of the ground – not that of the treetops – is required; in very large scale work or close contouring; or if the features to be mapped are not easily identifiable on the aerial photographs, as is the case with property boundaries or zones of transition between different types of soil or vegetation. One of two fundamental differences between ground and air survey is that, as already mentioned, the ground survey interpolates, or sketches, between fixed points, while air survey, using semiautomatic instruments, can trace the features continuously, once the positions of the photographs are known. One effect of this is to show features in uniform detail rather than along short stretches between the points fixed in a ground survey. The second difference is that in ground survey different techniques and accuracies may be adopted for the horizontal and vertical measurement. The methods used for fixing locations within the horizontal detail framework are similar to, but less accurate than, those used for the primary framework. Angles may be measured with a hand-held prismatic compass or graphically with a plane table, or they may be estimated as right angles in the case of points that are offset by short distances from straight lines between points already fixed. Detail points may be located by their distances from two fixed points or by distance and bearing from only one. The surveyor may record measurements made in the field and plot them there on a sketch board or in the office afterward, but if the country is open and hilly, or even mountainous, the plane table offers the best way of recording the data. A disadvantage of plane-table work is that it cannot be checked in the office, and so it requires

greater intelligence and integrity of the surveyor. The plane table reached its most efficient form of use in the Survey of India, begun in 1800, in which large areas were mapped with it by dedicated Indian surveyors. It consists of a flat board that is mounted on a tripod so that it can be fixed or rotated around a vertical axis. It is set up over a framework point or one end of a measured baseline with its surface (which is covered with paper or other drawing medium) horizontal. It is turned until the line joining its location with another framework point or the other end of the baseline is parallel to the same line as drawn on the paper. This alignment is performed with the aid of an alidade, or sight rule, a straightedge fitted with simple sights. The alidade is then directed toward points on features that are to be fixed, and pencil rays are drawn along the sight rule toward them. The procedure is repeated at the other framework point or the other end of the baseline; the points where the rays intersect on the table will be the map positions of the features. In surveying for engineering projects, more sophisticated instruments are employed to maximize accuracy. For example, distances may be measured by EDM or by tachymetry, a geometric technique in which the vertical distance on a graduated vertical staff, seen between two stadia hairs in the theodolite eyepiece, is a measure of the horizontal distance between the theodolite and the staff – usually 100 times the difference between the two readings. This method requires at least one assistant to move the staff from place to place. Modern surveying instruments combine a theodolite, EDM equipment, and a computer that records all the observations and calculates the height differences obtained by measuring vertical angles.

Notes: 1. Ground survey – наземная съёмка; 2. Railway gradient – уклон железной дороги; 3. Prismatic compass – компас с оптической передачей; 4. Planetable – мензула; 5. Alidade – алидада, угломер; 6. Tachymetry – тахеометрическая съёмка, тахеометрия; 7. Theodolite eyepiece – окуляр теодолита.

MODERN SURVEYING AERIAL SURVEYING

Aviation and photography have revolutionized detailed mapping of features visible from the air. An aerial photograph, however, is not a map. In the case of the House of Parliament and Westminster Bridge, London, for example, the tops of the towers would coincide with the corners of the foundations when mapped. In an aerial photograph, however, they would not, being displaced radially from the centre. An important property of vertical aerial photographs is that angles are correctly represented at their centres, but only there. Similar distortions are present in photographs of hilly ground. This problem may be dealt with in two principal ways, depending on the relative scales of the map and the photographs and on whether contours are required on the map. The older method, adequate for planimetric maps at scales smaller than the photographs, was used extensively during and after World War II to map large areas of desert and thinly populated country; mountainous area could be sketched in, but the relief was not accurately shown. As in ground survey, a framework of identified points is necessary before detailed mapping can be carried out from the air. The photographs are ordinarily taken by a vertically aligned camera in a series of strips in which each picture overlaps about 60 percent of the preceding one; adjacent strips overlap only slightly. The overlaps make it possible to assemble a low-order framework or control system based on small, recognizable features that appear in more than one photograph. In the simplest form of this procedure each photograph is replaced by a transparent template on which rays are drawn (or slots are cut) from the centre of the picture to the selected features. The angles between these rays or slots are correct, and slotted

templates can be fitted together by inserting studs, which represent the features, into the appropriate slots and sliding the templates so that each stud engages the slots in all the pictures showing the corresponding feature. This operation ensures that the centres of the pictures and the selected features are in the correct relationship. The array of overlapping photographs can be expanded or contracted by sliding them about on the work surface as long as the studs remain engaged in the slots, so the assemblage can be positioned, oriented, and scaled by fitting it to at least two – preferably several – ground control points identified on different photographs. This technique may be extended by using two additional cameras, one on each side, aimed at right angles to the line of flight and 30 degrees below the horizontal. The photographs taken by the side cameras overlap those taken by the vertical one and also include the horizon; the effect is to widen the strip of ground covered and thus to reduce the amount of flying required. Points in the backgrounds of the oblique photographs can be incorporated in the overlapping array as before to tie the adjacent flight paths together. Photography from high-flying jet aircraft and satellites has rendered this technique obsolete, but before those advances took place it greatly facilitated the mapping of underdeveloped areas. For the production of maps with accurate contours at scales five or six times that of the photographs, a more sophisticated approach is necessary. The ground-survey effort must be expanded to provide the heights as well as the positions of all the features employed to establish the framework. In this technique the details within each segment of the map are based not on individual photographs but on the overlap between two successive ones in the same strip, proceeding from the positions and heights of features in the corners of each area. A three-dimensional model can be created by viewing each pair of consecutive photographs in a stereoscope; by manipulation of a specially designed plotting instrument, the overlapping area can be correctly positioned, scaled, and oriented, and elevations of points within it can be derived from those of the four corner points. These photogrammetric plotting instruments can take several forms. In projection instruments the photographs are projected onto a table in different colours so that, through spectacles with lenses of complementary colours, each eye sees only one image, and the operator visualizes a three-dimensional model of the ground. A table or platen, with a lighted spot in the middle, can be moved around the model and raised or lowered so that the spot appears to touch the ground while the operator scans any feature, even if it is located on a steep hillside. A pencil directly beneath the spot then plots the exact shape and position of the feature on the map. For contouring the platen is fixed at the selected height (at a scale adjusted to that of the model), and the spot is permitted to touch the model surface wherever it will; the pencil then draws the contour. With more complex mechanical devices, rays of the light reaching the aircraft taking the two photographs are represented by rods meeting at a point that represents the position of the feature of the model being viewed. With a complicated system of prisms and lenses the operator, as with projection instruments, sees a spot that can be moved anywhere in the overlap and up or down to touch the model surface. A mechanical or electronic system moves a pencil into the corresponding position on a plotting table to which the map manuscript is fixed. With computerized analytic instruments the mechanical operation is limited to measuring coordinates on the two photographs, and the conversion to a three-dimensional model is performed entirely by the computer. It is possible with the most precise plotting instruments of either type to draw a map at four to six times the scale of the photographs and to plot contours accurately at a vertical interval of about one one-thousandth of the height from which the photographs were taken. With such analytic instruments the record can be stored in digital as well as graphic form to be plotted later at any convenient

scale. All these methods produce a line or drawn map; some of them also create a data file on disk or tape, containing the coordinates of all the lines and other features on the map. On the other hand, aerial photographs can be combined and printed directly to form a photomap. For flat areas this operation requires simply cutting and pasting the photographs together into a mosaic. For greater accuracy the centres of the photographs may be aligned by the use of slotted templates to produce a photomap called a controlled mosaic. A much more precise technique is based on the use of an orthophotoscope. With this device, overlapping photographs are employed just as in the stereoscopic plotter, but the instrument, rather than the manual tracing of the features and contours, scans the overlap and produces an orthophotograph by dividing the area into small sections, each of which is correctly scaled. This procedure is best applied to areas of low relief without tall buildings; the resulting maps can then be substituted for line maps in rural areas where they are practically useful in planning resettlement in agricultural projects. Because no fair drawing is required, the final printed map can be produced much more quickly and cheaply than would otherwise be possible.

Notes: 1. Planimetric map – карта без изображения рельефа; 2. Adjacent strip – смежный маршрут; 3. Overlap – перекрытие (листов карты или аэроснимков); 4. Transparent template – прозрачный шаблон; 5. Plotting instrument – картосоставительский прибор; 6. Platen – прижимное устройство; 7. Photomap – карта, составленная по аэрофотосъёмочным данным; 8. Controlled mosaic – ориентированный фотоплан; 9. Orthophotoscope – ортофотоскоп; 10. Stereoscopic plotter – стереообработывающий прибор.

MODERN SURVEYING HYDROGRAPHY

Surveying of underwater features, or hydrographic surveying, formerly required techniques very different from ground surveying, for two reasons: the surveyor ordinarily was moving instead of stationary, and the surface being mapped could not be seen. The first problem, making it difficult to establish a framework except near land or in shoal areas, was dealt with by dead reckoning between points established by astronomical fixes. In effect a traverse would be run with the ship's bearing measured by compass and distances obtained either by measuring speed and time or by a modern log that directly records distances. These have to be checked frequently, because however accurate the log or airspeed indicator and compass, the track of a ship or aircraft is not the same as its course. Crosscurrents or winds continually drive the craft off course, and those along the course affect the speed and the distance run over the ground beneath. The only way a hydrographer could chart the seabed before underwater echo sounding and television became available was to cast overboard at intervals a sounding line with a lead weight at the end and measure the length of the line paid out when the weight hit the bottom. The line was marked in fathoms, that is, units of one one-thousandth of a nautical mile, or approximately six feet (1,8 metres). Sounding by lead is obviously very slow, especially in deep waters, and the introduction of echo sounding in the early 20th century marked a great improvement. It was made possible by the invention of electronic devices for the measurement of short intervals of time. Echo sounding depends on timing the lapse between the transmission of a short loud noise or pulse and its return from the target – in this case the bottom of the sea or lake. Sound travels about 5,000 feet (1,500 metres) per second in water, so that an accuracy of a few milliseconds in measurements of the time intervals gives depths within a few feet. The temperature and density of water affect the speed at which sound waves travel through it, and allowances have to be made for variations in

these properties. The reflected signals are recorded several times a second on a moving strip of paper, showing to scale the depth beneath the ship's track. The echoes may also show other objects, such as schools of fish, or they may reveal the dual nature of the bottom, where a layer of soft mud may overlies rock. Originally only the depth that was directly beneath the ship was measured, leaving gaps between the ship's tracks. Later inventions, which include sideways-directed sonar and television cameras, have made it possible to fill these gaps. While measurements of depths away from the ship's track are not so accurate, the pictures reveal any dangerous objects such as rock pinnacles or wrecks, and the survey vessel can then be diverted to survey them in detail. Modern position-fixing techniques using radar have made the whole process much simpler, for the ship's location is now known continuously with reference to fixed stations on shore or satellite tracks. Another modern technique is the use of pictures taken from aircraft or satellites to indicate the presence and shape of shoal areas and to aid the planning of their detailed survey. An alternative to the use of radar or satellite signals for continuous and automatic recording of a ship's position is the employment of inertial guidance systems. These devices, developed to satisfy military requirements, detect every acceleration involved in the motion of a craft from its known starting point and convert them and the elapsed time into a continuous record of the distance and direction traveled. For studying the seabed in detail, the bottom of the sounding lead was hollowed to hold a charge of grease to pick up a sample from the sea floor. Today television cameras can be lowered to transmit pictures back to the survey ship, though their range is limited by the extent to which light can penetrate the water, which often is murky. Ordinary cameras also are used in pairs for making stereoscopic pictures of underwater structures such as drilling rigs or the wreckage of ancient ships.

Notes: 1. Hydrographic surveying – гидрографическая съёмка; 2. Shoal area – мелководная зона; 3. Astronomical fix – астрономическая точка; 4. Fathom – фатом; 5. Echosounding – промер глубин эхолотом; 6. Survey vessel – гидрографическое судно; 7. Elapsed time – прошедший промежуток времени; 8. Stereoscopic picture – стереоскопическое изображение.

MODERN SURVEYING HEIGHT DETERMINATION

Heights of surface features above sea level are determined in four main ways: by spirit leveling, by measuring vertical angles and distances, by measuring differences in atmospheric pressure, and, since the late 20th century, by using three-dimensional satellite or inertial systems. Of these the first is the most accurate; the second is next in accuracy but faster; the third is least accurate but can be fastest if heights are to be measured at well-separated 22 points. The last two techniques require sophisticated equipment that is still very expensive. In spirit leveling the surveyor has for centuries used a surveying level, which consists of a horizontal telescope fitted with cross hairs, rotating around a vertical axis on a tripod, with a very sensitive spirit level fixed to it; the instrument is adjusted until the bubble is exactly centred. The reading on a graduated vertical staff is observed through the telescope. If such staffs are placed on successive ground points, and the telescope is truly level, the difference between the readings at the cross hairs will equal that between the heights of the points. By moving the level and the staffs alternately along a path or road and repeating this procedure, differences in height can be accurately measured over long horizontal distances. In the most precise work, over a distance of 100 kilometres the error may be kept to less than a centimeter. To achieve this accuracy great care has to be taken. The instrument must have a high-magnification telescope and a very sensitive bubble, and the

graduated scale on the staff must be made of a strip of invar (an alloy with a very small coefficient of thermal expansion). Moreover, the staffs must be placed on pegs or special heavy steel plates, and the distance between them and the level must always be the same to cancel the effects of aerial refraction of the light. In less precise work a single wooden staff can be used; for detailed leveling of a small area, the staff is moved from one point to another without moving the level so that heights can be measured with a radius of about 100 metres. The distances of these points from the instrument can be measured by tape or more commonly, by recording not only the reading at the central cross hair in the field of view of the telescope but also those at the stadia hairs, that is by tachymetry. The bearing of each point is observed by compass or on the horizontal circle of the level so that it can be plotted or drawn on the map. Since the 1950s levels have been introduced in which the line of sight is automatically leveled by passage through a system of prisms in a pendulum, thus removing the need to check the bubble. The disadvantage of spirit leveling is the large number of times the instrument has to be moved and realigned, particularly on steep hills; it is used primarily along practically flat stretches of ground. For faster work in hilly areas, where lower accuracies usually are acceptable, trigonometric height determination is employed using a theodolite to measure vertical angles and measuring or calculating the distances by triangulation. This procedure is particularly useful in obtaining heights throughout a major framework of triangulation or traverse where most of the points are on hilltops. To increase precision, the observations are made 23 simultaneously in both directions so that aerial refraction is eliminated; this is done preferably around noon, when the air is well mixed. The third method of height determination depends on measurements of atmospheric pressure differences with a sensitive aneroid barometer, which can respond to pressure differences small enough to correspond to a foot or two (0.3 to 0.6 metre) in height. The air pressure changes constantly, however, and to obtain reliable results it is necessary to use at least two barometers; one at reference point of known height is read at regular intervals while the surveyor proceeds throughout the area, recording locations, times, and barometer readings. Comparison of readings made at the same time then gives the height differences. An alternative to the barometer for pressure measurement is an apparatus for measuring the boiling point of a liquid, because this temperature depends on the atmospheric pressure. Early explorers determined heights in this way, but the results were very rough; this technique was not accurate enough for surveyors until sensitive methods for temperature measurement were developed. The airborne profile recorder is a combination of this refined apparatus with a radar altimeter to measure the distance to the ground below an aircraft. Analysis of the signals received simultaneously from several satellites gives heights as accurately as positions. Heights determined in this way are useful in previously unmapped areas as a check on results obtained by faster relative methods, but they are not accurate enough for mapping developed areas or for engineering projects. All-terrain vehicles or helicopters can carry inertial systems accurate enough to provide approximate heights suitable for aerial surveys of large areas within a framework of points established more accurately by spirit leveling.

Notes: 1. Cross hairs – сетканитей; 2. Readings – показания измерительных приборов; 3. High-magnification – большое увеличение; 4. Graduated scale – масштабная линейка; 5. Thermal expansion – термальное расширение; 6. Stadia hairs – дальномерные нити; 7. Pendulum – маятник; 8. Aneroid barometer – барометр-анероид; 9. Airborne profile recorder – бортовой высотомер с самописцем; 10. Radar altimeter – радарный высотомер.

3D LASER SCANNING FOR CULTURAL HERITAGE

In the last years, thanks to the advances of surveying sensors and techniques, many heritage sites could be accurately replicated in digital form with very detailed and impressive results. The actual limits are mainly related to hardware capabilities, computation time and low performance of personal computer. Often, the produced models are not visible on a normal computer and the only solution to easily visualize them is offline using rendered videos. This kind of 3D representations is useful for digital conservation, divulgation purposes or virtual tourism where people can visit places otherwise closed for preservation or security reasons. But many more potentialities and possible applications are available using a 3D model. Almost 50 years ago, the Venice Charter (International Charter for the Conservation and Restoration of Monuments and Sites, 1964) stated: “It is essential that the principles guiding the preservation and restoration of ancient buildings should be agreed and be laid down on an international basis, with each country being responsible for applying the plan within the framework of its own culture and traditions”. But nowadays the need for a clear, rational, standardized terminology and methodology, as well as an accepted professional principle and technique for interpretation, presentation, digital documentation and presentation is still not established. Furthermore, “...Preservation of the digital heritage requires sustained efforts on the part of governments, creators, publishers, relevant industries and heritage institutions. In the face of the current digital divide, it is necessary to reinforce international cooperation and solidarity to enable all countries to ensure creation, dissemination, preservation and continued accessibility of their digital heritage” (UNESCO Charter on the Preservation of the Digital Heritage 2003). Therefore, although we may digitally record and produce models, we also require more international collaborations and information sharing to digitally preserve and make them accessible in all the possible forms and to all the possible users and clients. But despite all these international statements, the constant pressure of international heritage organizations and the recent advances of 3D recording techniques, a systematic and targeted use of 3D surveying and modelling in the Cultural Heritage field is still not yet employed as a default approach for different reasons: 1) the idea of high costs for 3D models; 2) the difficulties in achieving good 3D models by everyone; 3) the thought that 3D is an optional process of interpretation and an additional ‘aesthetic’ factor, i.e. traditional 2D documentation is enough; 4) the difficulty of integrating 3D worlds with other more standard 2D material; 5) the lack of powerful and reliable software to handle 3D data and produce standard documentation material. New technologies and new hardware are pushing to increase the quality of 3D models with the purpose of attracting new people into the 3D world. Many companies entered inside this market developing and employing software and survey systems with good potentialities and often very impressive results. Indeed the number of 3D products is huge and if one hand the cost of these technologies is slowly reducing, on the other hand it’s difficult, in particular for nonspecialists, to select the right product due to a lack of standard terminology and specifications. Furthermore, new technologies can for sure be a powerful tool to improve the classical standard of documentation and create a new methodology, however caution must be used and they have to be further studied and customized to be fully effective and useful, since even the standard bi-dimensional representations are still not problem-free. When planning a 3D surveying and modeling project, beside all the technical parameters that should be kept in mind (e.g. location, accessibility, geometric detail, budget), a very crucial thing to know is the final user of the 3D data and the final project’s goal, in order to clarify what is actually needed. Nowadays there is a large number of geomatics data acquisition tools for mapping purposes and

for visual Cultural Heritage digital recording. These include satellite imagery, digital aerial cameras, radar platforms, airborne and terrestrial laser scanners, UAVs, panoramic linear sensors, SRL or consumer-grade terrestrial digital cameras and GNSS/INS systems for precise positioning. Beside data acquisition systems, today new software has been developed and many automated data processing procedures are available. For what concerned new functionality for 3D data management, there are new advances in Geographic Information Systems (GIS) and 3D repositories (e.g. BIM) while in the visualization field the rendering and animation software are now more affordable with lower costs and higher results. The continuous development of new sensors, data capture methodologies and multi-resolution 3D representations are contributing significantly to the documentation, conservation, and presentation of heritage information and to the growth of research in the Cultural Heritage field. The generation of reality-based 3D models of heritage sites and objects is nowadays performed using methodologies based on passive sensors and image data, active sensors and range data, classical surveying (e.g. total stations or GNSS), 2D maps, or an integration of the aforementioned techniques. The choice or integration depends on the required accuracy, object dimensions, location constraints, instrument's portability and usability, surface characteristics, project's budget and final goal of the 3D survey. Identify the best approach in every situation is not an easy task but it is nowadays clear that the combination and integration of different sensors and techniques, in particular when surveying large and complex sites, is the ideal solution in order to: 1) exploit the intrinsic strengths of each technique, 2) compensate for weaknesses of individual methods, 3) derive different geometric Levels of Detail of the scene under investigation that show only the necessary information and 4) achieve more accurate and complete geometric surveying for modelling, interpretation, representation and digital conservation issues. The Stonehenge laser scan survey undertaken back in 2011 successfully demonstrates the recording, documentation and archaeological analysis application of laser scanning as well as its latent potential for deriving new data. This new survey aimed to record both the world famous prehistoric monument and 'The Triangle' landscape immediately surrounding it by applying a range of laser scanning systems from Leica Geosystems and Zoller und Fruehlich (Z+F) with varying specifications and data capture capabilities. In December 2013 a new visitor centre was opened at Stonehenge containing a number of displays based on the laser scan data. These included interpretation and tactile reconstructions of the henge monument and a new 'Stand in the Stones' virtual display that every visitor now experiences when entering the new centre. Such a project therefore demonstrates that laser scanning can successfully record heritage sites and monuments and provides a range of useable outputs encompassing traditional, modern and virtual requirements. The importance of Cultural Heritage documentation is well recognized and there is an increasing pressure at international level to preserve them also digitally with long-lasting and standard formats. Indeed 3D data are today a critical component to permanently record the shape of important objects so that, in digital form at least, they might be passed down to future generations. This concept has produced firstly a large number of projects, mainly led by research groups, which have realized very high quality and complete digital models and secondly has alerted the creation of guidelines describing standards for correct and complete 3D documentations and digital preservation.

Notes: 1. Geomatics – геоинформатика (geo+informatics); 2. Digitalrecording – цифровая регистрация; 3. Satelliteimagery – изображение спутниковых данных; 4. Radarplatform – радиолокационная установка; 5. Panoramicsensor – панорамный датчик; 6. GNSS

(Global Navigation Satellite System) – глобальная навигационная спутниковая система (ГНСС); 7. INS (Inertial Navigation System) – инерциальная навигационная система (ИНС).

TOOLS AND PRODUCTS OF MODERN GEODESY

Today, the toolbox of geodesy comprises a number of space-geodetic and terrestrial techniques, which together allow for detailed observations of the «three pillars of geodesy» (Geokinematics, Earth Rotation, the Gravity Field) on a wide range of spatial and temporal scales. With a mix of terrestrial, airborne, and spaceborne techniques, geodesy today determines and monitors changes in Earth's shape, gravitational field and rotation with unprecedented accuracy, resolution (temporal as well as spatial), and long-term stability. At the same time, geodetic observation technologies are in constant development with new technologies extending the observation capabilities almost continuously in terms of accuracy, spatial and temporal coverage and resolution, parameters observed, latency and quality. Together, these observations provide the basis to determine and monitor the ITRF and ICRF as the metrological basis for all Earth observations. Equally important, the observations themselves are directly related to mass transport and dynamics in the Earth system. Thus, the geodetic measurements form the basis for Earth system observations in the true meaning of these words. Beutler et al. suggested a development towards an interdisciplinary service in support of Earth sciences for the IGS. With the establishment of GGOS, IAG has extended this concept of an observing system and service for Earth system sciences to the whole of geodesy. It is obvious that there is an intimate relationship between the three pillars of geodesy and the reference systems and frames. For geokinematics and Earth rotation, the relationship works both ways: the reference systems are required for positioning purposes (terrestrial and celestial) and for studying Earth rotation, and monitoring through the space geodetic techniques is necessary to realize the two frames and the time-dependent transformation between them. The ICRF, the ITRF, and the EOPs are needed to derive a gravity field, which is consistent with the ICRF, the ITRF, and the corresponding EOPs. Therefore, one might think at first that the gravity field is not necessary to define and realize the geometric reference systems. However, in order to realize

Text 14 TOOLS AND PRODUCTS OF MODERN GEODESY Today, the toolbox of geodesy comprises a number of space-geodetic and terrestrial techniques, which together allow for detailed observations of the «three pillars of geodesy» (Geokinematics, Earth Rotation, the Gravity Field) on a wide range of spatial and temporal scales. With a mix of terrestrial, airborne, and spaceborne techniques, geodesy today determines and monitors changes in Earth's shape, gravitational field and rotation with unprecedented accuracy, resolution (temporal as well as spatial), and long-term stability. At the same time, geodetic observation technologies are in constant development with new technologies extending the observation capabilities almost continuously in terms of accuracy, spatial and temporal coverage and resolution, parameters observed, latency and quality. Together, these observations provide the basis to determine and monitor the ITRF and ICRF as the metrological basis for all Earth observations. Equally important, the observations themselves are directly related to mass transport and dynamics in the Earth system. Thus, the geodetic measurements form the basis for Earth system observations in the true meaning of these words. Beutler et al. suggested a development towards an interdisciplinary service in support of Earth sciences for the IGS. With the establishment of GGOS, IAG has extended this concept of an observing system and service for Earth system sciences to the whole of geodesy. It is obvious that there is an intimate relationship between the three pillars of geodesy and the reference systems and frames.

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Notes: 1. Spatial scale – пространственный масштаб; 2. ITRF (International Terrestrial Reference Frame) – Международная система наземных координат; 3. ICRF (International Celestial Reference Frame) – Международная небесная система координат; 4. IGS (International GNSS Service) – Международная служба GNSS; 5. GNSS (Global Navigation Satellite System) – глобальная навигационная спутниковая система; 6. GGOS (Global Geodetic Observing System) – глобальная система геодезических наблюдений; 7. IAG (International Association of Geodesy) – международная ассоциация геодезии (МАГ); 8. EOP (Earth orientation parameters) – параметры ориентации Земли; 9. SLR (Satellite Laser Ranging) – спутниковая лазерная локация; 10. DORIS (Doppler Orbitography and Radiopositioning Integrated by Satellite) – Доплеровская орбитография. 29

OBSERVING EARTH'S ROTATION SPACE-GEODETIC TECHNIQUES VLBI: VLBI observes radio signals emitted by quasars. These fixed points constitute the ICRF, and variations in the orientation of the Earth are measured with respect to the ICRF. This technique is sensitive to processes that change the relative position of the radio telescopes with respect to the source, such as a change in the orientation of the Earth in space or a change in the position of the telescopes due to, for example, tidal displacements or tectonic motions. If just two telescopes are observing the same source, then only two components of the Earth's rotation can be determined. A rotation of the Earth about an axis parallel to the baseline connecting the two radio telescopes does not change the relative position of the telescopes with respect to the source, and hence this

component of the Earth's orientation is not determinable from VLBI observations taken on that single baseline. Multibaseline VLBI observations with satisfactory geometry can determine all of the components of the Earth's rotation including their time rates-of-change. In fact, the motion of the axis of rotation of the Earth in space (precession and nutation) and the rotation angle around the axis of rotation are uniquely monitored by VLBI through its direct connection to the ICRF.

GNSS: GNSS signals observed by a network of ground stations can be used to determine the orientation of the network of receivers as a whole. In practice, in order to achieve higher accuracy, more sophisticated analysis techniques are employed to determine the EOPs and other quantities such as orbital parameters of the satellites, positions of the stations, and atmospheric parameters such as the zenith path delay. Only polar motion and its time rate-of-change can be independently determined from GNSS measurements. UT1 cannot be separated from the orbital elements of the satellites and hence cannot be determined from GNSS data. The time rate-of-change of UT1, which is related to the length of the day, can be determined from GNSS measurements. But because of the corrupting influence of orbit error, VLBI measurements are usually used to constrain the GNSS-derived Length of Day (LOD) estimates.

SLR and LLR: Although a number of satellites carry retro-reflectors for tracking and navigation purposes, the LAGEOS I and II satellites were specifically designed and launched to study geodetic properties of the Earth including its rotation and are the satellites most commonly used to determine EOPs. Including range measurements to the Etalon I and II satellites have been found to strengthen the solution for the EOPs, so these satellites are now often included in the process. The EOPs are recovered from the basic range 30 measurements in the course of determining the satellite's orbit and station coordinates. However, because variations in UT1 cannot be separated from variations in the orbital node of the satellite, which are caused by the effects of unmodeled forces acting on the satellite, it is not possible to independently determine UT1 from SRL measurements.

Independent estimates of the time rate-of-change of UT1, or equivalently, of LOD, can be determined from SLR measurements, as can polar motion and its time rate-of-change. In the case of LLR, the EOPs are typically determined from observations by analyzing the residuals each station after the lunar orbit and other parameters such as station and reflector locations have been fit to the range measurements. From this single station technique, two linear combinations of UT1 and the polar motion parameters can be determined, namely, UT0 and the variation of latitude at that station. A rotation of the Earth about an axis connecting the station with the origin of the terrestrial reference frame does not change the distance between the station and the Moon, and hence this component of the Earth's orientation cannot be determined from single station LLR observations.

DORIS: Processing DORIS observations allows the orbit of the satellite to be determined along with other quantities such as station positions and EOPs. As with other satellite techniques, UT1 cannot be determined from DORIS measurements, but its time rate-of-change can be determined, as can polar motion and its rate-of-change.

Notes: 1. VLBI (Very Long Baseline Interferometry) – радиоинтерферометрия со сверхдлинными базами (РСДБ); 2. Tectonic motion – тектоническое движение; 3. Rate-of-change – скорость измерения; 4. Precession – прецессия; 5. Nutation – нутация; 6. Zenith path – направление луча в зените; 7. Polar motion – движение полюсов; 8. UT1 (Universal Time) - универсальное время - основная версия всемирного времени; 9. LLR (Lunar Laser Ranging) - лазерная локация Луны; 10. UT0 (Universal Time) - всемирное время, определяемое с помощью наблюдений суточного движения звёзд или внегалактических радиоисточников, а также Луны и искусственных спутников Земли. 31

CONSISTENCY OF DATA COLLECTION AND PROCESSING: CONVENTIONS

Since the very early days, international geodesy has always adhered to some form of standards and conventions, the best known of which being the Geodetic Reference System (GRS), revised appropriately on decadal scales, the last version being GRS80. GRS consistently covered geometry, gravity and rotation, albeit at the very top level of required constants and the most basic formulae, with an eye towards classical techniques and approaches, which at the time were still the main source of geodetic products. At that time however, a new project was conceived and successfully executed with international participation at all levels, including design, execution and evaluation; a project that would eventually lead geodesy from the classical era to that of the space age. The project Monitoring Earth Rotation and Inter-comparison of Techniques (MERIT), acted as the pilot for what was later to become the IERS. Along with it came an expanded compilation of constants and standard formulas, mostly associated with the reference frame and Earth rotation, to be used by the project participants. These came to be known as the MERIT standards and with the establishment of the IERS, they became the basis for the development of the IERS Conventions as we know them and use them today. While, at the beginning, the Conventions mainly served as a guideline for the purpose of data analyses and reduction for Earth orientation monitoring only, they gradually developed as the reference for geometry and reference frame work as well, including all aspects of the required techniques, from geometric modeling of the observables to all of the required geometric and dynamic corrections in order to achieve the accuracy that IERS expected for these products. To achieve this, the Conventions slowly expanded to encompass models and constants that were well beyond the observations for geometry and rotation, including the gravity field and all of its temporal variations (tides and secular changes as well as loading effects from the oceans and atmosphere), relativistic corrections and environmental corrections (e.g. atmospheric delays). The area where these Conventions are focused is that of the space geodetic observations, leaving out most of the constants and practices for ground-based geodesy. This is perhaps due to the fact that the products that concern IERS are of global nature and none of the ground-based geodetic techniques can contribute significantly or compete with the satellite-borne or space-based techniques. Looking at it from a spectral view, they cover the long-wavelength part of the spectrum of products. Geodesy however can deliver significant information at the high-frequency end of the spectrum, albeit in some areas only. One of these areas, the most important one, is that of the gravitational field of Earth. Ground and airborne surveys provide very high quality and high-resolution local information that is used along with the long-wavelength information obtained from spaceborne instruments (CHAMP, GRACE, GOCE), to develop extremely high resolution global Earth gravity models that will never be derived from space data alone. This is the area that the Conventions need to cover in more detail, both, in the description of the required constants and the standard formulas and practices in reducing such data. Once this is accomplished, the foundations of all three pillars will be ably supported by the same, unique set of Conventions and Standards. While the expansion and enrichment of the existing Conventions and Standards is a rather simple task, the actual enforcement in practice is by far a more challenging task. While most institutions seek to be part of the appropriate IAG Service in order for their products be granted the seal of approval from that Service, it is usually very difficult to force the required changes in the software and the procedures followed by that institution to make it conform with the IERS rules. As most Services discovered, it took years for the various Analysis Centers within a technique to achieve this harmonization. It will take quite

an effort to ensure that this harmonization exists also across techniques, since the geodetic products are for the most part a combination of inputs from several if not all of the Services. An even more difficult and taxing effort will be required in making sure that not only the same constants, theoretical or empirical models, and reduction procedures are consistent, but also all of the background information used in forward-modeling geophysical processes are also consistently derived and applied in the various analyses and reductions of geodetic observations. When all of the above are accomplished, there is still going to be an issue concerning the parameterization of the same effects across techniques. Recognizing that not all techniques are equally sensitive (or sensitive at all) to all of the geodetic products, we will need to identify what parameters each technique should deliver and at what frequency, in order to ensure that this information can be easily and readily combined with inputs from other techniques. The issue has been given enough attention for the set of parameters that cover the geometric and rotational group, with only minor attention given to some very long-wavelength gravity information. To some extent this approach has been reasonable since the very short wavelength gravitational information is well below the sensitivity of any space technique at this point, and for many years to come. There are other areas though where part of such information can be applied in a different form, as a constraint to the results obtained from the global space techniques. For example, incorporating some absolute gravity measurements at a few points 33 on Earth in the development of a precise orbit from some type of tracking data is practically meaningless. On the other hand, imposing a constraint on the height change of a tracking station based on repeated absolute gravity measurements at that site is a very useful piece of information independent of the primary source of data determining the position and motion of that site. Such synergetic use of various inputs with a common, single output can only be done if the information from all sources adheres to one set of conventions.

Notes: 1. Geodetic Reference System (GRS) - глобальный датум с моделью гравитационного поля Земли; 2. International Earth Rotation and Reference Systems Service (IERS) – Международная служба вращения Земли (МСВЗ); 3. Reference frame – система координат; 4. Secular changes – вековые изменения; 5. Relativistic corrections – релятивистские поправки; 6. Satellite-borne – установленный на искусственном спутнике; 7. Long-wavelength – длинноволновый; 8. Forward-modeling – опережающее моделирование; 9. Parameterization – параметеризация. Text 17 GEODETIC IMAGING TECHNIQUES InSAR The processing of Synthetic Aperture Radar (SAR) images using the