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**МИНИСТЕРСТВО НАУКИ И ВЫСШЕГО ОБРАЗОВАНИЯ
РОССИЙСКОЙ ФЕДЕРАЦИИ**

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УТВЕРЖДЕНО:

**Ученым советом КНИТУ-КАИ
(в составе ОП ВО)**

КОМПЛЕКТ ОЦЕНОЧНЫХ МАТЕРИАЛОВ

по дисциплине (модулю)

ФТД.В.01. Специальный английский язык

(индекс дисциплины по учебному плану, наименование дисциплины)

Чистополь 2023

Комплект оценочных материалов по дисциплине (модулю) разработан для обучающихся всех форм обучения по направлению подготовки (специальности):

Код и наименование направления подготовки (специальности)	Направленность (профиль, специализация, магистерская программа)
12.03.01 Приборостроение	Приборостроение

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Комплект оценочных материалов по дисциплине (модулю) рассмотрен на заседании кафедры компьютерных и телекоммуникационных систем, протокол № 8 от 26.05.2023г.

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1 ОЦЕНОЧНЫЕ МАТЕРИАЛЫ ПО ОСВОЕНИЮ ДИСЦИПЛИНЫ (МОДУЛЯ)

Текущий контроль успеваемости обеспечивает оценивание хода освоения дисциплины (модуля).

Промежуточная аттестация предназначена для оценки достижения запланированных результатов обучения по завершению изучения дисциплины (модуля) и позволяет оценить уровень и качество ее освоения обучающимися.

Комплект оценочных материалов представляет собой совокупность оценочных средств (комплекс заданий различного типа с ключами правильных ответов, включая критерии оценки), используемых при проведении оценочных процедур (текущего контроля, промежуточной аттестации) с целью оценивания достижения обучающимися результатов обучения по дисциплине (модулю).

1.1 Оценочные средства и балльные оценки для контрольных мероприятий

Таблица 1.1 Объем дисциплины (модуля) для очной формы обучения

Семестр	Общая трудоемкость дисциплины (модуля), в ЗЕ/час	Виды учебной работы											
		<i>Контактная работа обучающихся с преподавателем по видам учебных занятий (аудиторная работа), в т.ч.:</i>							<i>Самостоятельная работа обучающегося (внеаудиторная работа), в т.ч.:</i>				
		Лекции	Лабораторные работы	Практические занятия	Курсовая работа (консультация, защита)	Курсовой проект (консультация, защита)	Консультации перед экзаменом	Контактная работа на промежуточной аттестации	Курсовая работа (подготовка)	Курсовой проект (подготовка)	Проработка учебного материала (самоподготовка)	Подготовка к промежуточной аттестации	Форма промежуточной аттестации
5	1 ЗЕ/36	-	-	16	-	-	-	0,35	-	-	19,65	-	зачет
Итого	1 ЗЕ/36	-	-	16	-	-	-	0,35	-	-	19,65	-	

Таблица 1.1, б – Объем дисциплины (модуля) для заочной формы обучения

Семестр	Общая трудоемкость дисциплины (модуля), в ЗЕ/час	Виды учебной работы												
		<i>Контактная работа обучающихся с преподавателем по видам учебных занятий (аудиторная работа)</i>							<i>Самостоятельная работа обучающегося (внеаудиторная работа)</i>					
		Лекции	Лабораторные работы	Практические занятия	Курсовая работа (консультация, защита)	Курсовой проект (консультация, защита)	Консультации перед экзаменом	Контактная работа на промежуточной аттестации	Курсовая работа (подготовка)	Курсовой проект (подготовка)	Проработка учебного материала (самоподготовка)	Подготовка к промежуточной аттестации	Форма промежуточной аттестации	
5 семестр	1 ЗЕ/32	-	-	4	-	-	-	0,35	-	-	24	3,65	зачет	
Итого	1 ЗЕ/32	-	-	4	-	-	-	0,35	-	-	24	3,65		

Текущий контроль успеваемости и промежуточная аттестация по дисциплине (модулю) осуществляется в соответствии с балльно-рейтинговой системой по 100-балльной шкале. Балльные оценки для контрольных мероприятий представлены в таблице 1.2. Пересчет суммы баллов в традиционную оценку представлен в таблице 1.3.

Таблица 1.2 Балльные оценки для контрольных мероприятий

Наименование контрольного мероприятия	Максимальный балл на первую аттестацию	Максимальный балл за вторую аттестацию	Максимальный балл за третью аттестацию	Всего за семестр
5 семестр				
Тестирование	4	4	4	12
Реферат текста	6	6	8	20
Лексический диктант	3	3	3	9
Контрольное задание	3	4	2	9
Итого (максимум за период)	19	18	13	50
Зачет				50
Итого				100

Таблица 1.3 Шкала оценки на промежуточной аттестации

Выражение в баллах	Словесное выражение при форме промежуточной аттестации - зачет	Словесное выражение при форме промежуточной аттестации – экзамен, зачет с оценкой
от 86 до 100	Зачтено	Отлично
от 71 до 85	Зачтено	Хорошо
от 51 до 70	Зачтено	Удовлетворительно
до 51	Не зачтено	Неудовлетворительно

Форма и организация промежуточной аттестации по итогам освоения дисциплины – зачет проводится в два этапа. Пороговый – в виде итогового тестирования, далее анализ текста и ответы на вопросы по страноведческим текстам.

2 Оценочные средства для проведения текущего контроля

2.1 Тестовые вопросы

Тестовые вопросы содержат следующие типы вопросов с соответствующим количеством баллов за правильный ответ:

Тип вопроса	Количество баллов за правильный ответ
запрос выбора вариантов ответа	1

Семестр 5 текущая аттестация 1

1 My car needs a service badly, and Tom offered ... me with it.

- a) **to help**
- b) helping
- c) helped

2 The city council seems ... the architect's design for a new market.

- a) **to have accepted**
- b) accept accepting
- c) to be accepted

3 They would like ... to Bill's party.

- a) having invited
- b) **to be invited**

c) to have been invited

4 Although I was in a hurry, I stopped ... to him.

a) to talk

b) talking

c) having talking

5 You should ... to other people instead of... about yourself all the time.

a) to listen, to talk

b) listen, talking

c) listening, to talk

6 Jane seems ... some weight. How long has she been on a diet?

a) **to have lost**

b) having lost

c) lost

7 Nobody can expect you ... overtime

a) working

b) work

c) to work

8 All parts of London seem ... to different times and epochs.

a) to belong

b) belonging

c) belonged

9 My grandparents made me ... them next week.

a) to promise to call

b) promise to call

c) promising to call

10 While ... a car one should be very attentive.

a) driving

b) to drive

- c) having driven
- 11 The engine ... showed that it needed no further improvement.
- a) testing
 - b) tested**
 - c) having test
- 12 If the solid is heated, it ...
- a) **will expand,**
 - b) would expand
 - c) expanded
- 13 The motion of electrons will increase in case we ...
- a) would rise the temperature
 - b) rise the temperature**
 - c) will rise the temperature
- 14 If he had examined the motor, he ...
- a) wouldn't switched it on.
 - b) wouldn't switch it on
 - c) wouldn't have switched it on**
- 15 In case they created the device, they ...
- a) will conduct interesting observations.
 - b) would conduct interesting observations**
 - c) would have conducted interesting observations
- 16 We will continue research if the necessary data
- a) will be received
 - b) is received**
 - c) are received
- 17 The reactor would be brought into operation provided all the preparations ...
- a) would be completed.
 - b) were completed**
 - c) completed
- 18 The mechanism is provided with a special device for the whole system ... automatically.
- a) functioning
 - b) to function**
 - c) function
- 19 We know the machine ... to a series of electrical impulses that can be represented in binary numbers
- a) to react**

- b) reacting
 - c) have react
- 20 Printers are known ... greatly in performance and design.
- a) varying
 - b) vary
 - c) **to vary**
- 21 We are looking forward to ... on a tour of Paris by our French friends.
- a) **being taken**
 - b) having been taken
 - c) taking
- 22 He followed up this remarkable declaration by ... his head.
- a) having shaken
 - b) **shaking**
 - c) shook
- 23 When we had finished ..., the waiter brought us the bill.
- a) eaten
 - b) to eat
 - c) **eating**
- 24 Would you mind ... the front door?
- a) having closed
 - b) to close
 - c) **closing**
- 25 Why have you stopped? Go on ...
- a) to read
 - b) **reading**
 - c) read
- 26 I can't help ... about that awful accident.
- a) to think
 - b) thought
 - c) **thinking**

27 What do you feel like ... for breakfast?

a) to have

b) having

c) had

28 We are looking forward to ... on a tour of Paris by our French friends.

a) being taken

b) to take

c) having been taken

29 Most people enjoy ... to different parts of the world.

a) to travel

b) having travelled

c) travelling

30 I remember... a woman outside when I went in.

a) to see

b) seeing

c) saw

31 The new bridge across the Kama by 2001.

a) was built

b) have built

c) had been build

32 The girl... next to Emma is her niece.

a) being sat

b) having been sat

c) sitting

33 You must keep on ... the computer until you understand how ... all of the programs.

a) practise, to use

b) practising, using

c) practising, to use

34 Most passengers dislike ... in small, uncomfortable seats on transoceanic flights.

d) sitting

e) sit

f) to sit

35 ... nothing about the trouble, my grandfather felt comfortable and quiet,

g) Having been told

h) Telling

i) Having told

Семестр 5 текущая аттестация 2

36 The guide promised ... the tourists at the station.

a) meeting

b) to meet

c) met

37 Instead of... the letter, she went away.

a) finishing

b) finish

c) to be finishing

38 The letter... yesterday was most welcome.

a) receiving

b) having received

c) received

39 All of them enjoyed ... tennis.

a) to play

b) playing

c) play

40 Stop ... at me! I'll get everything finished before I go to bed.

a) to grumble

b) grumbling

c) to be grumbling

41 I look forward to ... you the next time I'm in town.

a) see

- b) to see
- c) **seeing**

42 While ... the street in the wrong place, the boy was stopped by the policeman.

- a) **crossing**
- b) being crossed
- c) having been crossed

43 Although my father slammed on his brakes, he couldn't ... the dog that suddenly darted out in front of the car.

- a) avoid to hit
- b) **avoid hitting**
- c) be avoided hitting

44 ... their supper, the family started watching television.

- a) Being finished
- b) **Having finished**
- c) Having been finished

45 I couldn't help ... when heard the joke.

- a) to laugh
- b) laugh
- c) **laughing**

46 Measures should ...to avoid such a problem in future.

- a) take
- b) **be taken**
- c) have been taken
- d) to be taken

47 How would you feel if you ... to spend hours in a wheel chair?

- a) have been forced
- b) are forced
- c) **were forced**
- d) will be forced

48 A lot of money ... from the bank on Monday.

- a) has been stolen
- b) have been stolen
- c) were stolen
- d) was stolen**

49 Your order is guaranteed ... within 3 days.

- a) to deliver
- b) will be delivered
- c) to be delivered**
- d) to will have been delivered

50 When did you discover that the child ...?

- a) was kidnapped
- b) has been kidnapped
- c) had been kidnapped**
- d) had kidnapped

51 The famous actor ... for the magazine.

- a) will interviewed
- b) will be interviewed**
- c) will interview with me
- d) was already interviewed

52 I don't know when the goods I've ordered ... to my place.

- a) will be delivered**
- b) are delivered
- c) will have been delivered
- d) will be being delivered

53 The hotel bill ... by my wife early in the morning.

- a) was payed
- b) will payed
- c) will paid
- d) was paid**

54 Many new houses ... by next year.

- a) will built
- b) will build
- c) will have been built**
- d) will be built

55 Some antique vases ... in the old mansion.

- a) **were found**
- b) were find
- c) were founded
- d) were finded

56 Unfortunately, the flight

- a) was just delayed
- b) had just been delayed
- c) is just been delayed
- d) **has just been delayed**

57 Our tent ... in the night by the wind.

- a) was blew
- b) **was blown**
- c) had been blew
- d) had been blown

58 Does he ... leave immediately?

- a) have
- b) should
- c) **have to**

59 You ... finish the work by 4 p.m. tomorrow.

- a) ought
- b) **should**
- c) have

60 She ... do this task yesterday because she was free.

- a) **could**
- b) can
- c) have to

61 The letters at the moment.

- a) are typing

- b) are being typed**
c) were typed
- 62 Guernica by Picasso.
- a) has painted
b) is painted
c) paints
- 63 The parcel yet.
- a) have not been delivered
b) has not been delivered
c) has not delivered
- 64 Alpha Romeo cars in Italy.
- a) are make
b) are made
c) made
- 65 The thief late last night.
- a) has been arrested
b) was arrested
c) had been arrested
- 66 The announcement tomorrow.
- a) is made
b) will be made
c) will make
- 67 ... the water resources several laws were passed in Russia.
- a) protecting
b) protection
c) to protect
- 68 Lasers ... on Earth satellites will transform solar radiation into laser beams.
- a) to place
b) to be placed
c) placing

69 The plant will produce the new type of machine-tools now being imported from abroad.

- a) Завод производит новый тип инструментов, вывозимых за границу.
- b) Завод выпустил новый тип станков, которые сейчас вывозят за границу.
- c) **Завод будет производить новый тип станков, которые сейчас ввозят из-за границы.**

70 Before signing the contract, he wanted to get the approval of the chairman.

- a) **Перед подписанием контракта он хотел получить одобрение председателя.**
- b) Перед подписанием контракта он хочет получить разрешение председателя.
- c) Перед подписанием контракта он хотел извиниться перед председателем.

71 By 1960 the numbers of cars in the world had reached 60 million, no other industry having ever developed so quickly.

- a) Число машин в мире к 1960 году достигло 60 миллионов при быстром развитии других отраслей промышленности.
- b) **К 1960 году число автомобилей в мире достигло 60 миллионов, причем ни одна другая промышленность не развивалась так быстро.**
- c) Когда ни одна отрасль промышленности не развивалась, к 1960 году количество автомобилей в мире достигло 60 миллионов.

72 The mechanic was surprised at your having broken such a simple device so quickly.

- a) **Механик был удивлен тем, что ты так быстро сломал такое простое устройство.**
- b) Механик был удивлен твоей поломкой такого прибора так быстро.
- c) Механик удивился, увидев сломанный тобой прибор.

73 Were he a good specialist, he wouldn't come across so many difficulties solving this matter.

- a) Поскольку он был хорошим специалистом, он не столкнулся с большим количеством трудностей при решении этого вопроса.
- b) **Будь он хорошим специалистом, он бы столкнулся с таким количеством трудностей, растворяя это вещество.**

- с) Если бы он был хорошим специалистом, он бы не столкнулся с таким количеством трудностей при решении этого вопроса.**

74 If the equipment is installed tomorrow, we shall be able to start the work.

- а) Если оборудование будет установлено завтра, мы сможем начать работу.**
- б) Если бы оборудование было установлено завтра, мы смогли бы начать работу.
- с) Если оборудование установить завтра, нам будет разрешено начать работу.

75 Nuclear fuel is expected to be used more extensively for the development of power industry.

- а) Ожидается, что ядерное топливо будет все более широко использоваться для развития энергетической промышленности.**
- б) Ожидалось, что ядерная энергия используется все более широко для развития энергетической промышленности.
- с) Ядерное топливо ожидает все более широкое использование для развития энергетической промышленности.

76 They supposed the greater part of energy to be used for supplying plants in that region.

- а) Они предполагают, что большая часть энергии должна использоваться для снабжения заводов в этом регионе.
- б) Они предполагали, что большая часть энергии используется для снабжения заводов в этом регионе.**
- с) Они предложили, чтобы большая часть энергии была использована для завода в этом регионе.

77 The hydroelectric power plant to be built in this region will be of greater importance for the development of local industry.

- а) Построенная в этом районе гидроэлектростанция имеет большое значение для развития местной промышленности.
- б) Гидроэлектростанция должна быть построена в этом районе, и она будет иметь большое значение для развития местной промышленности.

с) Гидроэлектростанция, которая будет построена в этом районе, будет иметь большое значение для развития местной промышленности.

78 The plan had been fulfilled by this plant by the first of November.

a) План был выполнен этим заводом к первому ноября.

b) Завод выполнил план к первому ноября.

c) Завод выполнит план к первому ноября.

79 The substances obtained we subjected to a chemical change.

a) Субстанция была подвергнута химическому воздействию.

b) Мы подвергли химическому воздействию полученное вещество.

c) Мы получили вещества и сделали их предметом химического изменения.

80 With the current being switched on, the machine automatically starts operating.

a) Ток включают, и машина начинает работать автоматически.

b) Со включенным током машина начнет работать автоматически.

c) Когда включают ток, машина начинает работать автоматически.

81 Electronic instrument for measuring resistance.

a) charger

b) ohmmeter

c) satellite

82 Device for collecting or sending out signals being transmitted through free space.

a) satellite

b) amplifier

c) aerial

83 Current which regularly changes direction backwards and forwards.

a) alternating current

- b) direct current
- c) anode current

84 Counting system using only two digits, 0 and 1.

- a) decimal
- b) binary**
- c) circuit

85 Insulated wire or set of wires used for carrying electrical current or signals.

- a) cable**
- b) fibre
- c) bunch

86 Basic property of electricity, either positive (+) or negative (-).

- a) electron
- b) particle
- c) charge**

87 A device which converts fuel into work

- a) engine**
- b) amplifier
- c) diode

88 Material which allows current to flow.

- a) conductor**
- b) insulator
- c) dielectric

89 Insulating material used to separate the plates of a capacitor

- a) conductor
- b) insulator

c) **dielectric**

90 Device, which produces electrical energy

a) engine

b) **generator**

c) battery

91 Electronic circuit containing many components on a single silicon chip.

a) microelectronics

b) **integrated circuit**

c) impulse

92 Keep in good working order

a) **maintain**

b) amplify

c) rectify

93 Electromagnetic wave sent out in all directions.

a) **radiation**

b) resistivity

c) transmission

94 Telecommunications device, which circles the earth to receive, amplify, and retransmit signals around the world

a) amplifier

b) aerial

c) **satellite**

95 Measure of electronics force.

a) resistance

b) **voltage**

c) current

96 Material, which does not allow current to flow.

- a) conductor
- b) semiconductor
- c) **insulator**

97 The resistance experienced when two bodies rub against each other.

- a) **friction**
- b) resistivity
- c) conduction

98 A device for controlling something from a distance.

- a) transmitter
- b) accelerator
- c) **remote control**

99 A bank of information stored in the computer for easy access.

- a) **database**
- b) input unit
- c) hardware

100 A metal formed by mixing together other metals and elements.

- a) ceramic
- b) brittle
- c) **alloy**

2.4 Выполнение лабораторных работ

Лабораторные работы учебным планом не предусмотрены

2.5 Расчетно-графическая работа

Расчетно-графическая работа учебным планом не предусмотрена

2.6 Вопросы на занятиях (опрос, онлайн-опрос)

Опрос на занятиях предполагает открытый ответ по изучаемому тексту

Примерный текст для работы на занятии и к зачету:

A Hint of Axions

An experiment may have seen an elusive new particle

By Graham P. Collins (Scientific American, July 2006, P.13)

Named after a laundry detergent and originally proposed to clean up a problem with particle physics, axions are curious critters. Axions produced during the big bang could be lurking all around us, contributing to the dark matter that constitutes 22 percent of the universe. Other axions, freshly formed inside the sun, could be streaming through us. And according to a paper published in March, laboratory-made axions might have been detected for the first time by an experiment in Italy known as PVLAS (polarization of the vacuum with a laser).

Axions are posited to have exceedingly low mass – less than a millionth that of an electron – and are electrically neutral. They interact only very weakly with other particles, making detection difficult. But physicists predict that a tiny fraction of any photons passing through a magnetic field will change into axions. (That is how the sun is predicted to produce them.) Indeed, the Italian experiment, based at the National Laboratories of Legnaro and led by Emilio Zavattini and Giovanni Cantatore of the INFN Trieste, saw evidence for axions in the behavior of a laser beam. The beam's polarization was rotated by 10 millionths of a degree after transiting 44,000 times back and forth through an extremely strong magnetic field. Such rotation is just the fingerprint expected if some photons converted to invisible axions, or more precisely, what physicists call axion-like particles.

From its data, the PVLAS group infers the mass of the putative axions and how strongly they interact. Puzzlingly, however, the results contradict other observations and do not fit with constraints deduced from astrophysics. In particular, the CERN Axion Solar Telescope (CAST) ran for six months in 2003 and failed to detect any axions arriving from the sun. That result would seem to rule out a large swath of possible masses and interaction strengths, including the values seen by PVLAS. Furthermore, if axions interact as strongly as PVLAS indicates, they should be produced in large quantities in stars, causing stars to grow old much faster than they are known to. Such considerations "put the bar pretty high before one can accept the PVLAS results," says axion expert Pierre Sikivie of the University of Florida and CERN. On the other hand, he adds, "these people are very competent, and they have worked on it a long time." By all accounts, the PVLAS researchers have been careful to exclude effects that could be confounding the data; moreover, in work that is not yet published, the group

has also obtained consistent results with a different laser. Some theorists have already proposed ways to reconcile the PVLAS results with those of CAST and other astrophysical limits.

Only further experiments will determine the truth. If the PVLAS results are correct, then axions should appear in an experiment known as "shining a light through a wall." The idea is this: A laser beam is sent through a strong magnetic field at an opaque wall. Some of the photons in the beam are converted to axions, which pass through the wall. On the other side, another magnetic field induces a small fraction of the axions to convert back to photons, which can be detected. Such an experiment, using a large, strong magnet and sensitive photon detectors, would convincingly confirm (or refute) the PVLAS results in a matter of minutes. Research groups, including the PVLAS team, are gearing up to perform that experiment. By the end of the year the axion could be a firm addition to the particle menagerie – or back on physicists' most-wanted list.

Saving Symmetry

Physicists originally proposed the axion as part of a scheme to explain why the strong nuclear force preserves so-called CP symmetry, which relates the properties of particles and antiparticles. Calculations using the Standard Model of particle physics showed that the strong force could preserve CP only if a certain parameter in the theory was zero, and yet quantum effects tend to make the parameter nonzero. In 1977 Helen R. Quinn and Roberto D. Peccei, then at Stanford University, showed that by changing the parameter into a quantum field, its value would be driven to zero by a natural process. A side effect of the new field would be the existence of a new particle – the axion.

Пример вопросов на занятиях

№	Тип вопроса	Вопрос	Варианты ответа
1	Открытый ответ	Why are the particles called "axions"?	They are named after a laundry detergent and originally proposed to clean up a problem with particle physics
2	Открытый ответ	How were and are axions formed?	Some were produced during the big bang, others are produced inside the sun.
3	Открытый ответ	What physical characteristics do they have?	They have exceedingly low mass and are electrically neutral. They interact only very weakly with other particles.
4	Открытый ответ	Where can the evidence for	The evidence for axions can be

		axions be seen?	seen in the behavior of a laser beam.
5	Открытый ответ	What can you tell about the results of PVLAS group?	The PVLAS results are that axions should appear in an experiment known as "shining a light through a wall."

2.7 Курсовая работа

Курсовая работа учебным планом не предусмотрена

3. Оценочные средства для проведения промежуточного контроля (промежуточной аттестации)

Семестр	Вид промежуточной аттестации	Вид контрольного мероприятия	Балльные оценки
5	Зачет	Тестовые задания Реферирование и аннотирование текста. Знание глоссария по карточкам	0-20 0-20 10

3.1. Тестовые задания

Тестовые задания промежуточной аттестации представляют собой совокупность тестовых вопросов текущего контроля.

3.2 Комплексное задание (зачетный текст и карточка с вопросами)

Необходимо самостоятельно выбрать текст по специальности с оригинального англоязычного сайта объемом 3000 п.з. без пробелов, перевести его и на зачет предоставить реферат данного текста и аннотацию к нему по образцу. Так же требуется выучить глоссарий – необходимый минимум лексики по специальности.

Примерный текст для зачета

Boron Nanoribbons Reveal Surprising Thermal Properties in Bundles

ScienceDaily (Dec. 21, 2011) — Size matters... but apparently so does shape -- when it comes to conducting heat in very small spaces.

Researchers looking at the thermal conductivity of boron nanoribbons have found that they have unusual heat-transfer properties when compared to other

wire/tube-like nanomaterials. While past experiments have shown that bundles of non-metallic nanostructures are less effective in conducting heat energy than single nanostructures, a new study shows that bundling boron nanoribbons can have the opposite effect and "the thermal conductivity of a bundle of boron nanoribbons can be significantly higher than that of a single free-standing nanoribbon," according to a report in *Nature Nanotechnology*, published online on December 11.

The finding is the result of work by a multidisciplinary team headed by Ravi Prasher of the Advanced Research Projects Agency, Terry Xu of the University of North Carolina at Charlotte, and Deyu Li of Vanderbilt University (see a complete list of authors below).

Additionally, the researchers found that the unusual heat-transfer properties of boron nanoribbon bundles can be modified, allowing the higher thermal conductivity to be switched on and off through relatively simple physical manipulation. The study concludes that the ribbon structure of the nanomaterials is strongly related to the unusual thermal conductivity of the bundles.

Boron-based nanostructures are a promising class of high temperature thermoelectric materials -- substances that can convert waste heat to useful electricity -- and thermal conductivity is related to other thermoelectric properties. Physicists describe the transmission of heat energy in materials like boron as happening through the conduction of "phonons," quasi-wave-particles that carry energy through excitations of the material's atoms.

"What we found was largely unexpected," said Xu. "When two nanoribbons were put together, the thermal conductivity was found to rise significantly rather than staying the same or going down, as has been the case in previous measurements. It has been assumed that phonons were hampered by the interface between the individual nanostructures in similar materials.

"That seems to mean that the phonon can pass effectively through the interface between two boron nanoribbons," she said. "The question is whether or not this result is due to the weak van der Waals interactions between two nanostructures of ultra-flat geometry."

The team suspects that the reason for the enhanced thermal conductivity is due in large part to the flat surface structure of the nanoribbons, based on another experimental result that the group discovered by accident.

The nanoribbon bundles exhibiting the unexpectedly higher thermal conductivity were originally prepared in a solution of reagent alcohol and water, which was then allowed to evaporate, leaving some nanoribbons drawn together by van der Waals force (the weak attraction that non reactive and uncharged substances can have for each other). When other members of the team attempted to duplicate this result, however, the experiment failed and the bundles only had the

lower thermal conductivity of single ribbons. The researchers then noted that a significant difference between the two attempts was that the second experiment had used isopropyl alcohol rather than reagent alcohol in the solution. Since isopropyl alcohol was known to leave minute residue following evaporation, the researchers suspected that a residue was forming on the ribbons surfaces -- a fact that microscopy confirmed -- and the residue apparently prevented tight contact between two nanoribbons. Further tests were made on the lower-conducting bundles, where the ribbon interfaces were washed with reagent alcohol to remove the isopropyl residue, and in this experiment the higher thermal conductivity was achieved.

The results point to the conclusion that boron nanoribbons form better heat-conducting bundles because the ribbons flat surfaces allow for tighter, more complete contact between the individual structures through van der Waals interaction and improved transmission of phonons overall.

"The result implies that achieving a tight van der Waals interface between the ribbons is important in thermal conductivity, something their geometry encourages," Xu said. "It is possible that this result may have implications for other materials with ribbon-based nanostructures."

Xu notes that there are potential engineering applications for the finding come not just from the improved thermal conductivity of boron nanoribbon bundles, but also from the reversible nature of the effect.

"This may lead to a simple way to switch the thermal conductivity of the bundle on and off," she said. "If you want more heat dissipated, but only in certain conditions, you can apply a solution to create a bundle structure with tight bonds and higher thermal conductivity. It could similarly be reversed by adding a residue between the nanoribbons and reducing the thermal conductivity to that of an individual ribbon."

3.2.1 Вопросы на зачете/экзамене (вопросы к зачету)

Card 1 *Translate the words*

I

Aerial

Charge

Recording

Generator

Voltage

II

- передавать (сигнал)
- постоянный ток
- кабель
- мобильный(сотовый) телефон
- излучение.

Критерии оценивания

Перевод, реферат и аннотирование текста должны быть выполнены в полном объеме.

Суммарно оценивается работа по реферированию текста и ответы на вопросы по глоссарию в карточке. Ответы должны быть полными. Оценивается грамотность изложения реферата и четкое знание терминологии из глоссария.

Пример балльной системы оценивания:

Критерии оценивания	Количество баллов
- Реферат текста составлен по образцу в полном объеме. Студент излагает его без опоры на письменный текст. - Составлена аннотация текста - Студент знает и четко излагает переводы терминов из глоссария	22-30
Реферат текста составлен с незначительными ошибками. Студент излагает его с большим трудом. - Аннотация текста составлена неграмотно. - Студент плохо знает переводы терминов из глоссария, делает много ошибок.	11-21
Реферат текста составлен неверно. Студент читает реферат. - Аннотация текста отсутствует или составлена неверно. - Студент практически не знает переводы терминов из глоссария.	5-10
Реферат текста составлен неверно. - Аннотация текста отсутствует. - Студент может ответить 1-2 слова из глоссария.	1-4
-ответ не получен.	0