中国海洋大学 2021 年硕士研究生招生考试试题

科目代码：211　　科目名称：翻译硕士英语

Part I. Vocabulary and Grammar　　[20 points]

Directions: *There are twenty incomplete sentences in this part. Beneath each sentence there are four choices marked A, B, C and D. Choose ONE answer that best completes the sentence. Then write your answers on the Answer Sheet.*

1. In the 20th century, the invention of the cellphone _____ the means for meeting the increased demand for communications in societies.
   A. prevailed　B. alluded　C. provided　D. achieved
2. He criticized the repressive methods _____ by the country's government.
   A. facilitated　B. employed　C. exhausted　D. acquired
3. We are _____ affected by what happens to us in childhood.
   A. randomly　B. profoundly　C. cautiously　D. thoughtfully
4. They were planning to _____ the seventy officials still in the country.
   A. refute　B. exempt　C. evacuate　D. undermine
5. The materials have to be able to _____ high temperatures.
   A. withstand　B. uphold　C. embitter　D. suspend
6. With technological changes many traditional skills have become _____.
   A. unmatched　B. obsolete　C. temporary　D. transitional
7. The _____ of his evidence left serious room for doubt.
   A. acclimatization　B. expenditure　C. redundancy　D. inconsistency
8. The President resigned amid considerable _____.
   A. controversy　B. aptitude　C. contradiction　D. pretense
9. It is becoming _____ clear that this problem will not be easily solved.
   A. improbably　B. increasingly　C. instantaneously　D. reciprocally
10. Few buildings _____ the war intact.
    A. elevated　B. survived　C. revolved　D. suffocated

特别提醒：答案必须写在答题纸上，若写在试卷或草稿纸上无效。

11. Distribution of the food is going ahead using a _____ of local volunteers.
A. paradox B. detachment C. catalogue D. network

12. This valve _____ the flow of water.
A. interferes B. discloses C. regulates D. allows

13. Working with such interesting people has been very _____.
A. irrelevant B. stimulating C. dull D. reluctant

14. My grandmother, as usual, lamented the _____ in moral standards in today's society.
A. consumption B. decline C. contingency D. conviction

15. These are the courses _____ available.
A. fruitfully B. adequately C. presently D. notoriously

16. Anyway, you're here; you _____ stay.
A. would like to B. must better C. will go and D. might as well

17. _____ for his family, He'd have gone away long ago.
A. Had it not been B. If it had been C. It wouldn't have been D. If it were

18. He gripped his brother's arm _____ he be trampled by the mob.
A. however B. in order that C. lest D. no matter what

19. It did nothing _____ make us ridiculous.
A. but B. resulting from C. besides D. nevertheless

20. Choose the correct sentence.
A. The woman is Korean whose son you just talked with.
B. The woman you just talked with her son is Korean.
C. The woman whose Korean son you just talked with.
D. The woman whose son you just talked with is Korean.

Part II. Language Use [20 points]

Section A: Banked Cloze [10 points]

Directions: *In this section, there is a passage with TEN blanks. You are required to select one word for each blank from a list of fifteen choices given in a word bank following*

---

the passage. Read the passage through carefully before making your choices. You may not use any of the words in the bank more than once.

agreement	awakened	dispute	fragility	irreversible
magnitude	negatively	poisonous	positively	proliferation
reached	reversible	scarcity	stability	unraveled

Biological diversity has become widely recognized as a critical conservation issue only in the past two decades. The rapid destruction of the tropical rain forests, which are the ecosystems with the highest known species diversity on Earth, has **21.**_____people to the importance and **22.**_____ of biological diversity. The high rate of species extinctions in these environments is jolting, but it is important to recognize the significance of biological diversity in all ecosystems. As the human population continues to expand, it will **23.**_____ affect one after another of Earth's ecosystems. In terrestrial ecosystems and in fringe marine ecosystems (such as wetlands), the most common problem is habitat destruction. In most situations, the result is **24.**_____. Now humans are beginning to destroy marine ecosystems through other types of activities, such as disposal and run off of **25.**_____ waste; in less than two centuries, by significantly reducing the variety of species on Earth, they have **26.**_____ cons of evolution and irrevocably redirected its course.

Certainly, there have been periods in Earth's history when mass extinctions have occurred. The extinction of the dinosaurs was caused by some physical event, either climatic or cosmic. There have also been less dramatic extinctions, as when natural competition between species **27.**_____ an extreme conclusion. Only 0.01 percent of the species that have lived on Earth have survived to the present, and it was largely chance that determined which species survived and which died out.

However, nothing has ever equaled the **28.**_____ and speed with which the human species is altering the physical and chemical world and demolishing the environment. In fact, there is wide **29.**_____ that it is the rate of change humans are inflicting, even more than the changes themselves, that will lead to biological devastation. Life on Earth has continually been in flux as slow physical and chemical changes have occurred on Earth, but life needs time to adapt — time for migration and

genetic adaptation within existing species and time for the **30.**_____ of new genetic material and new species that may be able to survive in new environments.

Section B: Error Correction [10 points]

Directions: *The following passage contains TEN errors. Each indicated line contains a maximum of ONE error. In each case, only ONE word is involved. You should proofread the passage and correct it in the following way.*

For a wrong word, underline the wrong word and write the correct one in the blank provided at the end of the line.

For a missing word, mark the position of the missing word with a "∧" sign and write the word you believe to be missing in the blank provided at the end of the line.

For an unnecessary word, cross the unnecessary word with a slash "/" and put the word in the blank provided at the end of the line.

Example:

Television is rapidly becoming the literature of our periods. 1. time/times/period

Many of the arguments ~~having~~ used for the study of literature as 2. having

a school subject are valid for ∧ study of television. 3. the

A thought-provoking article by Andrew Devendorf asks whether personal experience with mental illness is a strength or a weakness in clinical psychology. Devendorf explains that applicants for graduate courses in psychology are often advised against mention their own mental health struggles, 31. _____

or those of their family, during the application process. For instance, one guide titled, *Uncensored Advice for Applying to Graduate School in Clinical Psychology* states that an application should not contain information that is widely appropriate and unprofessional. Applicants who disclose 32. _____

their own psychopathology, for example, are often

'screened out'. Devendorf tells how he was applying 33. _____

特别提醒：答案必须写在答题纸上，若写在试卷或草稿纸上无效。

for a research scholarship in clinical psychology, he decided to disclose that his brother had died by suicide at the age of 27. Devendorf felt that this fact was irrelevant, as it had deepened his interest in depression and his desire to help people with that condition. Devendorf didn't get the scholarship, and one of the evaluating committee members told him that the reference with his brother had hurt the application: They mentioned the other committee members expressed comfort in reading my application with comments such as this: "He has the awards, publications, and research experience, so why would he feel the need to share this?"

34. _____

35. _____

36. _____

These members reportedly voiced disapproval for my "oversharing" and were willing to discuss my application further. They viewed my personal experiences as a potential bias harming my objectivity as a young scientist. Devendorf goes on to argue that the stigma within psychology against disclosing one's own experiences needs to end. He points out that personal experience can offer many strengths to a psychologist, such as increasing insight into mental illness and more compassion for other sufferers. Being someone who has been a mental health researcher while suffer from mental illness myself, I found Devendorf's article very interesting, and I'd recommend it to anyone involving in clinical psychology.

37. _____

38. _____

39. _____

40. _____

Part III. Reading Comprehension [30 points]

Section A: Multiple-Choice Questions [20 points]

Directions: *In this section there are four reading passages, with each followed by five multiple-choice questions. For each of them there are four choices marked A, B, C and D. Choose ONE answer that best answers the question or completes the statement. Then write your answers on the Answer Sheet.*

<Passage One>

In a study published on October 30 in *Science*, a group of geneticists, evolutionary biologists, and archaeologists study the ancient dogs' DNA. The study not only helps uncover the evolutionary history of dogs, but also provides some **tantalizing** clues about prehistoric human culture. It opens a window onto the close, millennia-long relationship between humans and their canine companions.

"It's another layer to the understanding of human history," says Anders Bergström, one of the paper's lead authors. "We can uncover historical processes between human populations that aren't necessarily visible in human DNA."

Dogs make for interesting research subjects, from both a biological and an anthropological perspective. Domesticated dogs, wolves, and dingos all belong to the same species, even though dogs diverged evolutionarily from wolves sometime between 15,000 and 40,000 years ago. Since that split, people have bred dogs into the genetically distinct populations that we call breeds. By comparing dog genomes, we can learn about the human-made processes that produced these populations—and by studying ancient dog genomes, we can work to understand what those processes looked like far into the past.

Ancient DNA research is always a group effort, and this paper is no exception: It has 56 authors. Some of these people are archaeologists—in sites as far apart as Spain and Siberia, they dug up the bones of the 27 dogs examined in this study, who lived between 11,000 and 100 years ago. Other authors are the scientists who labored over these ancient specimens to extract and sequence their genetic material. And still others, like Bergström, analyzed the data for evidence of the evolutionary relationships among these 27 dogs, modern dogs, and wolves.

Studying ancient DNA poses some major methodological challenges. DNA degrades over time, so it's difficult to be confident in any given A, C, T, or G in an ancient genome. So to analyze the dog genomes, Bergström and his colleagues used F-statistics, which compare the whole genomes of different specimens to one another in order to determine

which pairs of animals are more or less closely related. "They tell you, with very few assumptions, that this specimen is closer to A than to B," Bergström says. "And, of course, that doesn't necessarily tell you what happened in terms of the historical process. But it tells you some basic facts about relationships." Scientists can then use this relational data to infer what the dog family tree must have looked like. Using this technique, the team was able to determine, for example, that ancient East Asian dogs are, surprisingly, more closely related to ancient European dogs than they are to ancient Middle Eastern dogs.

By building out this tree, Bergström and his colleagues discovered something surprising: 11,000 years ago, before many human groups had adopted agriculture, domesticated dog populations had already formed at least five genetically distinct groups. "At the end of the Ice Age, before any other animal had been domesticated, dogs had already branched out into separate lineages and spread out across the world," Bergström says. "A lot of these lineages are still represented today, in present-day dogs." In other words, breeds like today's Siberian huskies and German shepherds are descended from dog populations that were completely separate by around the year 9000 BC, if not earlier. "We can look at dogs in a park, and we can see the result of this process that started already before any humans had started farming, or before any other animal had been domesticated," Bergström says.

This information isn't just interesting from an evolutionary perspective. It also provides a clue about how early humans related to dogs, long before they had formed close relationships with any other species of animal. Laurent Frantz, professor of paleogenomics at the Ludwig Maximilian University of Munich and the study's other lead author, believes that this discovery provides reason to think that hunter-gatherers may have deliberately bred dogs for certain traits. "Maybe artificial selection was already strong," he says. "And maybe it was already something conscious that people were doing."

So, while it may be difficult to learn about prehistoric dogs by studying their modern descendants, the special insights afforded by ancient DNA can provide invaluable context for understanding how humans relate to dogs today. "Dogs are kind of unique in that they are a predator, a carnivore. And they were domesticated by hunter-gatherers, way before agriculture, and they were also able to spread so quickly to most groups," Bergström says. "It's somehow a surprisingly good fit for the human species to take on this animal as a companion—even though, *a priori*, it seems like an unlikely candidate for domestication."

If Bergström and his colleagues are right, the human tradition of living with, breeding, and protecting dogs, and of treating canines not just as useful tools but as sources of social connection and emotional support, could have an 11,000-year history. Even before they figured out how to cultivate crops, humans may very well have known how to take care of, and be taken care of by, their animals.

41. What does the word ***tantalizing*** in Paragraph 1 mean?
    A. Vague.
    B. Tempting.
    C. Profound.
    D. Agreeable.
42. Which of the following statements about the research findings is CORRECT?
    A. Dogs were domesticated after human groups adopted the agriculture.
    B. There were already several separate lineages of dogs 11,000 years ago.
    C. Other animals had been domesticated before dogs were domesticated.
    D. Many branches of ancient dogs cease to exist today.
43. What is the function of the F-statistics?
    A. F-statistics can establish the relations among specimens.
    B. F-statistics can tell the details of the evolutionary process of the dogs.
    C. F-statistics can fix the degraded DNA.
    D. F-statistics can show the family tree of the ancient dogs.
44. What can we learn from the last paragraph?
    A. Theoretically speaking, dogs are difficult to be domesticated.
    B. We can know much about the prehistoric dogs by studying modern dogs.
    C. Dogs are domesticated because they are carnivore.
    D. Dogs are treated only as useful tools 10,000 years ago.
45. What is the main idea of the passage?
    A. Studying the genomes of ancient dogs provides clues for prehistoric human culture.
    B. F-statistics are an important method of biology research.
    C. Dogs are good companions to human beings.
    D. The genomes of ancient dogs show that dogs are closely related to wolves.

<Passage Two>

The Maya city of Tikal is famous for its soaring palaces and temples. But something far more humble kept Tikal functioning: its water filtration system, the earliest known of its kind. Researchers recently discovered a volcanic mineral that captures microbes and heavy metals in one of Tikal's largest reservoirs. Because the material is not found nearby, the finding suggests the presence of a deliberate filter.

The finding contradicts the long-standing idea that the ancient world's technological prowess was concentrated in places such as Greece, Rome, Egypt, and China, says Kenneth Tankersley, an archaeological geologist at the University of Cincinnati (UC). "When it comes to purifying water, the Maya were millennia ahead."

Nestled in the tropical forests of northern Guatemala, Tikal flourished for more than 1000 years. At the height of its prosperity, around 700 C.E., it's thought to have been home to more than 45,000 people. "It was one of the **preeminent** Maya cities," says Nicholas Dunning, a UC geoarchaeologist.

But Tikal's people had to contend with a dry season lasting roughly from November through April. Storing water in reservoirs was a solution, but that water had to be fit to drink, said Lisa Lucero, an archaeologist at the University of Illinois, Urbana-Champaign, who was not involved in the research. "Keeping water clean was critical."

A few years ago, Dunning and his colleagues excavated sediments from several of Tikal's reservoirs. They were surprised to find that one of the largest reservoirs, Corriental, had significantly less contamination from heavy metals, toxin-producing algae, and a mineral associated with fecal pollution than the others. "The water quality at Corriental was much higher," Dunning says.

Somehow the Maya were filtering Corriental's water, the team hypothesized. "The Maya used gardens as their bathrooms," Dunning says. "The water coming into the reservoir would not have been very clean."

So, the researchers looked closer at the sediments at the bottom of the reservoir. The first hint of an ancient filter was the discovery of quartz crystals. The scientists found four distinct layers, each a few centimeters thick, of brownish, millimeter-scale crystals. (Such sand-size grains can be used for filtering water, but they don't capture all harmful microbes.) Then, the researchers examined the quartz in greater detail and discovered it was dotted with

even smaller crystals of "zeolites." This type of volcanic mineral can purify water by trapping both microbes and heavy metals within a porous structure, and they're still in widespread use today, Tankersley says. "Just about everything we drink, from bottled water to wine, is filtered through a zeolite filter."

The Maya wouldn't have known about the zeolites in rock, but they would have recognized purifying capabilities, the researchers suggest. A quartz- and zeolite-rich rock formation about 30 kilometers northeast of Tikal is the likely source of the material in Corriental reservoir, the team proposed last month in Scientific Reports. Water at this site "was clear and tasted good," Tankersley says.

There's, unfortunately, no direct evidence of what Corriental's filtration system looked like, Dunning says. However, the team has an idea: Woven reed matting may have held quartz- and zeolite-containing rocks underwater just upstream of the reservoir's inflow. Such a setup would have been periodically swept away by flash floods following a storm, which would explain the layers of quartz and zeolite found at the reservoir's base.

The discovery is a potent reminder of the Maya's technological capabilities, Lucero says. "It shows yet another level of amazement of what ancient peoples accomplished."

46. What does the word ***preeminent*** in Paragraph 3 mean?

A. Gorgeous.
B. Splendid.
C. Famous.
D. Important.

47. What can we learn about the Mayan water filtration system from the passage?

A. Scientists have figured out the structure of the system.
B. The water is filtered by a woven reed matting.
C. The key component of the system is a type of rock containing quartz and zeolite.
D. The system is set up in a rock formation about 30 kilometers northeast of Tikal.

48. Why does Tikal need a water filtration system?

A. There are many floods in that area.
B. There are many gardens in Tikal.
C. The rocks in Tikal have brownish, millimeter-scale crystals.
D. The water in reservoirs can be kept clean and drinkable in dry seasons.

49. Which of the following statements about the research is CORRECT?

A. The layers of quartz and zeolite were caused by flash floods which damaged the water filtration system.

B. The research team discovered the water filtration system by testing the water in Corriental.

C. The research team hypothesized that the Maya used Corriental's water to irrigate their gardens and clean their bathrooms.

D. The research team argued that the water filtration system was composed of 4 layers, each of which had its distinct functions.

50. What is the main idea of the passage?

A. The ancient Maya is capable of building the water filtration system.

B. A new Mayan city called Tikal is discovered by a group of archaeological geologists.

C. The Mayan mathematics is no less advanced than other ancient civilizations.

D. Mayan cities already have reservoirs.

<Passage Three>

Thanks to advances in artificial intelligence (AI) and machine learning, computer systems can now diagnose skin cancer like a dermatologist would, pick out a stroke on a CT scan like a radiologist, and even detect potential cancers on a colonoscopy like a gastroenterologist. These new expert digital diagnosticians promise to put our caregivers on technology's curve of bigger, better, faster, cheaper. But what if they make medicine more biased too?

At a time when the country is grappling with systemic bias in core societal institutions, we need technology to reduce health disparities, not **exacerbate** them. We've long known that AI algorithms that were trained with data that do not represent the whole population often perform worse for underrepresented groups. For example, algorithms trained with gender-imbalanced data do worse at reading chest x-rays for an underrepresented gender, and researchers are already concerned that skin-cancer detection algorithms, many of which are trained primarily on light-skinned individuals, do worse at detecting skin cancer affecting darker skin.

Given the consequences of an incorrect decision, high-stakes medical AI algorithms need to be trained with data sets drawn from diverse populations. Yet, this diverse training is not happening. In a recent study published in JAMA (the Journal of the American Medical Association), we reviewed over 70 publications that compared the diagnostic prowess of doctors against digital doppelgangers across several areas of clinical medicine. Most of the data used to train those AI algorithms came from just three states: California, New York and Massachusetts.

Whether by race, gender or geography, medical AI has a data diversity problem: researchers can't easily obtain large, diverse medical data sets—and that can lead to biased algorithms.

Why aren't better data available? One of our patients, a veteran, once remarked in frustration after trying to obtain his prior medical records: "Doc, why is it that we can see a specific car in a moving convoy on the other side of the world, but we can't see my CT scan from the hospital across the street?" Sharing data in medicine is hard enough for a single patient, never mind the hundreds or thousands of cases needed to reliably train machine learning algorithms. Whether in treating patients or building AI tools, data in medicine are locked in little silos everywhere.

Medical data sharing should be more commonplace. But the sanctity of medical data and the strength of relevant privacy laws provide strong incentives to protect data, and severe consequences for any error in data sharing. Data are sometimes sequestered for economic reasons; one study found hospitals that shared data were more likely to lose patients to local competitors. And even when the will to share data exists, lack of interoperability between medical records systems remains a formidable technical barrier. The backlash from big tech's use of personal data over the past two decades has also cast a long shadow over medical data sharing. The public has become deeply skeptical of any attempt to aggregate personal data, even for a worthy purpose.

This is not the first time that medical data have lacked diversity. Since the early days of clinical trials, women and minority groups have been underrepresented as study participants; evidence mounted that these groups experienced fewer benefits and more side effects from approved medications. Addressing this imbalance ultimately required a joint effort from the NIH, FDA, researchers and industry, and an act of Congress in 1993; it remains a work in progress to this day. One of the companies racing toward a COVID vaccine recently

announced a delay to recruit more diverse participants; it's that important.

It's not just medicine; AI has begun to play the role of trained expert in other high-stakes domains. AI tools help judges with sentencing decisions, redirect the focus of law enforcement, and suggest to bank officers whether to approve a loan application. Before algorithms become an integral part of high-stakes decisions that can enhance or derail the lives of everyday citizens, we must understand and mitigate embedded biases.

Bias in AI is a complex issue; simply providing diverse training data does not guarantee elimination of bias. Several other concerns have been raised—for example, lack of diversity among developers and funders of AI tools; framing of problems from the perspective of majority groups; implicitly biased assumptions about data; and use of outputs of AI tools to perpetuate biases, either inadvertently or explicitly. Because obtaining high-quality data is challenging, researchers are building algorithms that try to do more with less. From these innovations may emerge new ways to decrease AI's need for huge data sets. But for now, ensuring diversity of data used to train algorithms is central to our ability to understand and mitigate biases of AI.

To ensure that the algorithms of tomorrow are not just powerful but also fair, we must build the technical, regulatory, economic and privacy infrastructure to deliver the large and diverse data required to train these algorithms. We can no longer move forward blindly, building and deploying tools with whatever data happen to be available, dazzled by a veneer of digital gloss and promises of progress, and then lament the "unforeseeable consequences." The consequences are foreseeable. But they don't have to be inevitable.

51. What does the word ***exacerbate*** in Paragraph 2 mean?
    A. To worsen.
    B. To exaggerate.
    C. To overcome.
    D. To enlarge.
52. Why is the author worried that the healthcare AI systems may be biased?
    A. They are manipulated by large companies.
    B. They only serve the rich people.
    C. They are often trained with insufficient and biased data.
    D. They are complicated and often break down.

53. Which factor does NOT thwart medical data sharing?

A. The strong privacy laws.

B. Too many AI healthcare systems.

C. Economic reasons.

D. Lack of interoperability between medical records systems.

54. What can we learn about the female and minority patients from the passage?

A. There are usually more data from female patients than male patients.

B. Minority groups are unwilling to share their medical data.

C. The diagnoses of female patients are usually more accurate than male patients.

D. The data of the minority groups are insufficient.

55. Which of the following applications of AI healthcare systems is NOT mentioned in the passage?

A. Diagnosing skin cancer.

B. Performing CT scan.

C. Carrying out operations.

D. Detecting potential cancers on a colonoscopy.

<Passage Four>

The 197 radio astronomy dishes of the Square Kilometre Array (SKA) in South Africa will sit within a radio-quiet zone the size of Pennsylvania where even a cellphone is forbidden, to preserve the array's views of the heavens. Yet that precaution won't save the telescope, due to be completed in the late 2020s, from what may soon be overhead: tens of thousands of communications satellites beaming down radio signals straight from the heavens. "The sky will be full of these things," says SKA Director General Phil Diamond.

The rocket company SpaceX has already launched hundreds of Starlink satellites, the first "megaconstellation" intended to provide internet service to remote areas. The satellites have aroused the ire of optical astronomers because of the bright streaks they leave across telescopes' fields of view. Now, radio astronomers are worried, too. This week, SKA released an analysis of the impact that Starlink and other constellations would have on the array. It finds they would interfere with one of the radio channels SKA plans to use, hampering searches for organic molecules in space as well as water molecules used as a key marker in cosmology.

SpaceX is promising to address the concern. But radio astronomers are also seeking regulations. The United Nations Office for Outer Space Affairs (UNOOSA), which discussed the SKA analysis at a workshop this week, is considering ways to keep satellites from polluting the night sky with light and radio signals, not just for astronomy, but also for wildlife and the public. Astronomers also hope the International Telecommunication Union (ITU), a U.N. organization, will step in. "The radio spectrum is a resource that is being consumed by private companies that typically have no regard for science," says radio astronomer Michael Garrett, director of the Jodrell Bank Centre for Astrophysics in the United Kingdom. "It's only government intervention that can stop this state of affairs in my view."

So far, SpaceX has launched more than 700 Starlinks out of an initial goal of 1440, and it has won approval for 12,000. Other operators, such as OneWeb and Amazon's Project Kuiper, have similar ambitions. Studies suggest wide-field optical surveys will be worst affected, with satellite tracks marring most images. The team building the Vera C. Rubin Observatory, a survey telescope in Chile due to see first light next year, has been working with SpaceX to reduce the impact. The company has changed the orientation of satellites as they move up to their final orbit, painted them a less reflective color, and fitted "visors" to reduce reflections. Since August, all launched Starlink satellites have visors, SpaceX's Patricia Cooper, vice president for satellite government affairs, told the UNOOSA workshop this week. "We're trying to look for a path where we can coexist," she said.

The analysis from SKA, which when complete will be the world's largest radio observatory, highlights the new concern. The band that Starlink uses to beam down internet signals takes up a sizable chunk of frequencies from 10.7 to 12.7 gigahertz, within a range known as band 5b that is one of seven bands SKA's South African dishes will target. The SKA analysis calculated the impact of 6400 satellites, taking into account both direct signals and leakage called "side lobes."

The team calculated that satellite transmissions will lead to a 70% loss in sensitivity in the downlink band. If the number of satellites in megaconstellations reaches 100,000, as predicted by many, the entire band 5b would be unusable. SKA would lose its sensitivity to molecules such as the simplest amino acid, glycine, a component of proteins. "If it was detected in a planetary system that was forming, that would be a very interesting piece of information," Diamond says. "This is a new area that SKA is opening up." The band could

also contain the fingerprints of water molecules in distant galaxies, a tracer that cosmologists use to study how dark energy is accelerating the expansion of the universe.

Since 1959, ITU has protected a number of narrow frequency bands for astronomy. But in recent decades, digital receivers have allowed telescopes to "operate over the whole spectrum," Diamond says. "We've learned to coexist with transmitters," typically by excluding them from a radio quiet zone or siting telescopes in remote areas. But they have no control over transmitters flying overhead.

Radio astronomers want the satellite operators to turn off their transmitters, move to other bands, or point them away, when they are flying over a radio observatory. Tony Beasley, director of the U.S. National Radio Astronomy Observatory, says they have been discussing these options with SpaceX. "In the next year or two, we will be doing tests where we're going to be trying to coordinate in real time, technically, with them." Beasley says this is a reflection of SpaceX's corporate culture: "They want to do cool stuff; they don't want to do any harm."

Other astronomers don't want to count on corporate goodwill. At the UNOOSA workshop, they pushed for two recommendations: that all future satellites in low-Earth orbit be designed to avoid beaming at radio telescopes and radio quiet zones, and that they control the leakage from their side lobes. Those recommendations, along with others discussed this week for protecting optical observatories, will be debated at a series of U.N. subcommittees next year before going to UNOOSA and, ultimately, the U.N. General Assembly for approval.

Beasley is philosophical about the situation. "SpaceX is legally transmitting inside one of their bands and there are going to be impacts for anyone trying to do radio astronomy," he says. "These spectrum allocations represent the goals and intent of society. We make them to enable commerce and to enable defense and all kinds of activities. We have to come to a solution that satisfies all these to some extent."

56. What can we learn about the SKA telescope from the passage?

A. It is composed of more than 200 astronomy dishes.

B. It will be affected by Starlink's satellites if no measures are taken.

C. It is located in Pennsylvania.

D. It will be ready to use in 2020.

57. The following statements are about the communications satellites of SpaceX. Please choose the CORRECT one.

A. SpaceX has already launched thousands of satellites.

B. The optical astronomers are worried about them because they will emit radio signals.

C. These satellites can be used to observe faraway planets.

D. The function of these satellites is to provide Internet service.

58. What is SKA Director General Phil Diamond's major concern about the communications satellites of SpaceX?

A. They will block the sky above the SKA.

B. They will interfere with one of the radio channels SKA plans to use.

C. Their radio beams will damage the SKA.

D. They will cause environmental pollution and threaten wild animals.

59. Which of the following solutions is NOT mentioned in the passage?

A. Enacting regulations that reserve certain radio channels for astronomy.

B. Changing the orientation of satellites as they move up to their final orbit.

C. Preventing the satellites from flying over some regions.

D. Painting the satellites a less reflective color.

60. What is the main idea of the passage?

A. SpaceX and astronomers are trying to protect the radio telescopes from Starlink's interferences.

B. SpaceX has launched many satellites to provide Internet service.

C. The major mission of the SKA is to search for the signs of water in other planets.

D. Communications satellites help to search for organic molecules in space.

Section B: Short Answer Questions [10 points]

Directions: *In this section, there is one passage with FIVE open-ended questions. Read the passage carefully. Then answer the questions WITH NO MORE THAN TWENTY WORDS by using the information given in the passage. Please write your answers on the Answer Sheet.*

<Passage Five>

In 25 years of covering US planetary science, I've become used to seeing certain faces in press briefings, at conferences and on webcasts presenting discoveries from the NASA spacecraft exploring the Solar System. And I've enjoyed ferreting out the complex relationships between these researchers.

But I've never had a direct, sustained view of their interpersonal interactions. Now, sociologist Janet Vertesi has lifted the curtain for all to see. Embedded with various NASA projects for years, she takes readers into the heart of two of them — the Cassini mission to Saturn and the Mars Exploration Rovers.

What we see isn't always pretty. But it is useful. In *Shaping Science*, Vertesi does not simply describe the **nuts and bolts** of how these missions operate. Rather, she draws sweeping conclusions about the very nature of scientific discovery — what gets found — and how it depends on the ways in which scientists collaborate. That has implications for just about any group of researchers in any field.

Vertesi builds on classic work on the emergence of knowledge,. such as that of sociologists Harry Collins, who spent years embedded among gravitational-wave hunters, and Diane Vaughan, who explored the culture of space-shuttle managers to understand how they came to normalize risk. For Vertesi, planetary science is fertile ground for studying the organization of complex teams. For both Cassini and the Mars mission, large groups of scientists, engineers and managers designed, built and operated robots to serve as our emissaries to planets beyond Earth — but they did so in fundamentally different ways. (Distractingly, Vertesi pseudonymizes the missions as "Helen" and "Paris" and gives their players fake names, perhaps to preserve their privacy; cognoscenti will merely play 'guess who').

Cassini, which launched in 1997 and ended with a plunge into Saturn's atmosphere in 2017, was a high-stakes mission from the start. It was one of NASA's flagship planetary missions — costing billions of dollars, freighted with huge expectations, and partnered with the European Space Agency. As a result, it tried to mesh many competing interests into one functioning whole. A complex matrix approach linked groups focused around the specific aspect of the Saturnian system they wanted to study (rings, atmosphere, moons and so on). Mission leaders worked to integrate these aims. This often resulted in different working groups essentially bartering to achieve their science goals: 'You can photograph the rings at this particular time if I get to switch my plasma instrument on at another time.'

By contrast, the Mars rovers Spirit and Opportunity, which launched in 2003 and ended in 2010 and 2018, respectively, had one principal investigator (Steven Squyres, at Cornell University in Ithaca, New York, although Vertesi spares his blushes by calling him Jeremy). He led the team, with all members providing input to make decisions collectively. Researchers worked together to identify and settle on courses of action, such as what rock to investigate next or which direction to drive the rovers in.

Both Cassini and the Mars mission were wildly successful. They made discoveries fundamental to planetary science. But Vertesi argues that the nature of those discoveries was shaped by how their human operators asked questions.

Cassini revealed deep insights about the moons, rings and other parts of Saturn from the perspective of individual instruments — such as radar studies of how the lakes on Titan, Saturn's largest moon, changed over time. Spirit and Opportunity resulted in discoveries about specific rocks, dunes or other Martian landforms as seen by many instruments. The first approach yields encyclopedic knowledge in chunks; the second produces more of a synthesis of understanding about a particular landscape.

Seen through this lens, these missions offer lessons for teams more generally. Consider data sharing. Vertesi argues that the Mars mission embraced the concept of open data not just because it was a taxpayer-funded mission — the usual explanation — but because its flat, collectivist organization required it. Meanwhile, on Cassini, the leader of the camera team ended up in a cycle of distrust with other scientists when she attempted to maintain control over images from her group.

Unsurprisingly, Vertesi notes that institutional sexism probably had a role in the camera leader's difficulties (one project scientist said he would make her "mud-wrestle" a male researcher to resolve an issue). Other women did rise to positions of power in the Cassini mission, but mainly towards the end of the spacecraft's life. It was acceptable for women to run an existing mission, not a new one. Happily, this is changing: planetary scientist Elizabeth Turtle is leading NASA's upcoming Dragonfly mission to Titan.

Other lessons involve the challenge of managing people who don't all work in the same place — particularly acute in the age of COVID-19 and videoconferencing. Although mission control provides an organizational hub, many team scientists work remotely from their home institutions. They jostle for position from a distance — something all too familiar now. The Cassini team overcame the challenges of working across borders and time zones by nurturing a virtual sense of community, with photographs of tele-conference

participants on the wall (shades of endless Zoom calls to come). This gave overseas scientists access to a groundbreaking mission, and gave NASA researchers access to top talent worldwide.

Such take-home messages might be useful for collaborations getting off the ground. Vertesi notes that tech start-ups tend to favour the Mars-like flattened hierarchy around one charismatic leader. Bigger institutions, such as universities juggling the interests of departments and disciplines, often use a Cassini-like matrix.

In the end, science from both missions flowed directly from the people involved. No matter how the lakes on Titan shimmer, or what the mineralogy of a particular Martian rock turns out to be, it was the people behind the spacecraft, keyboards and endless tele-conferences that drove what these interplanetary robots discovered. I'm glad to have come to know them even better through this book.

61. What does the phrase ***nuts and bolts*** in Paragraph 3 mean?
62. How did the Cassini team overcome the challenges of working across borders and time zones?
63. What is the structure of the research team of Mars Exploration Rovers mission?
64. Why does the author believe that there is institutional sexism in the Cassini mission?
65. What are the differences between the findings of Mars Exploration Rovers mission and the Cassini mission?

Part IV. Writing [30 points]

Directions: *Write an essay according to the following information, and be sure to develop your essay with THREE supporting points. Write your essay of no less than 400 words on the Answer Sheet.*

In order to become well-rounded individuals, all college students should be required to take courses of literature and arts.

Please discuss the extent to which you agree or disagree with the above statement. Marks will be awarded both for your linguistic knowledge (i.e., grammar, vocabulary and organization) and for your ability to achieve the communicative purpose.