次の文章は、2018年3月26日にTHE JAPAN NEWS by Yomiuri Shimbunに掲載された"Quantum mechanics paves way to future"という見出しの記事である。これを読み、以下の設問に答えよ。なお、*のついた語句には注がある。

The set of theories that describe subatomic particles such as electrons* and photons* in the microworld falls into the field of quantum mechanics*, an area quite different from the world of classical physics, from which Newton's law of motion was derived.

The theory of quantum mechanics, which debuted about a century ago, was until recently more of an academic field. Now it's become a main theme in the development of innovative technologies.

One of the areas in which the theory of quantum mechanics is having the biggest impact is the development of quantum computers*.

①Conventional computers perform calculations by processing binary data comprised of the units 0 and 1.

Quantum computers, however, utilize phenomena particular to quantum mechanics — superposition and entanglement — to increase the（ A ）of possible states. Quantum computers can realize calculation speeds (1)［ than / super computers / are / that / overwhelmingly / of / those / faster / existing］ by utilizing a greater number of states.

Major information technology companies around the world are（ B ）competing to develop the technology, including the U.S.-based global IT companies.

A Canadian start-up company has sold commercially available quantum computers for several years.

Using the company's products, Denso Corp., a major Japanese auto parts manufacturer, has begun application research that can contribute to self-driving cars. Also, the Recruit group has made attempts to utilize quantum computers for optimizing advertisement distribution.

In Japan, a research and development project conducted by a telecommunications enterprise and others under a technology promotion program of the Cabinet Office has been attracting（ C ）.

While other types of quantum computers utilize electric or magnetic phenomena, (2)this project has adopted an original technique using pulses of light circulating in fiber-optic cables.

The team's first quantum computer was connected to the internet in November last year. This spring, universities and companies are beginning full-fledged studies into how to utilize the computer.

“As the first step, we want to achieve results in the field of drug discovery,” said a doctor of engineering, who heads the development project.

The synthesis of pharmaceutical products* involves the examination of candidate chemical compounds until ones（　D　）high medicinal effects are found. The process is work- and time-intensive.

(3)If the checks are made through calculations by ultra-fast quantum computers, promising candidate compounds can be narrowed down in less time, and the efficiency of drug development can be improved. The technology would make it easier to develop new medicines and thus could significantly influence the medical field.

It is assumed that quantum computers will also work well in complicated calculations for prime factor decomposition*.

In telecommunications, encryption* utilizing prime numbers is used to block interceptions.

If prime factor decomposition can be calculated easily with quantum computers, encrypted codes could be easily ②cracked. However, quantum mechanics could also be utilized to counter the threat. By applying principles of quantum mechanics theory, telecommunications could be made almost ③impervious to code cracking.

In autumn last year, China succeeded in holding a video conference via satellites using quantum encryption methods -- the first time this had been achieved anywhere in the world.

The United States has been on alert since learning of the technological leap. China’s technological success impacts the position of the United States in terms of cyber capabilities.

Applied research in the field of quantum mechanics, from technological innovations to national security, ④bears many aspects of a major battlefield.

In terms of the number of researchers and amount of research investments, Japan’s position is said to be inferior to those of the United States and European countries.

We must consider how best to support research and development in this field.

［注］ electron 「電子」； photon 「光子」； quantum mechanics 「量子力学」； quantum computers 「量子計算機」；
synthesis of pharmaceutical products 「医薬品合成」； prime factor decomposition 「素因数分解」； encryption 「暗号」

［設問］

問１　下線部①～④の語句の意味を，当該の文脈において最も正しく表している日本語を次のア～エから一つずつ選べ。

① conventional

（ア）社会的慣習による　　（イ）通常の

（ウ）伝統の　　（エ）独創性を欠いた

② cracked

（ア）ひびを入れられた　　（イ）破られた

（ウ）砕けた　　（エ）頭のおかしい

③ impervious

（ア）鈍感で　　（イ）絶対困難な

（ウ）損傷しないで　　（エ）不浸透性で

④ bear

（ア）子を産む　　（イ）担っている

（ウ）弱気な　　（エ）抱く

問２　空所(A)～(D)にふさわしい語句を，次のア～エからそれぞれ一つずつ選びなさい。

（　A　）

（ア） chance　（イ） amount　（ウ） likelihood（エ） number

（　B　）

（ア） more　（イ） hardly　（ウ） fiercely　（エ） secretly

（　C　）

（ア） audience（イ） people　（ウ） attention（エ） attendance

（　D　）

（ア）in　（イ） that　（ウ） on　（エ）with

問３　文脈に合った意味を表す英文になるように，下線部(1)の［　］内にある語句を正しく並べ替え，３番目と６番目にくる語句を答えよ。

問４　下線部(2)に“this project”とあるが、これについての説明として適切なものを，次の(ア)～(エ)のうちから一つ選べ。

（ア）a project with a quantum computers utilizing electro-magnetic phenomena

（イ）a project which employs quantum computers for distributions of advertisement

（ウ）a research carried out mainly by a telecommunications company

（エ）the Cabinet Office

問５　下線部(3)を和訳せよ。

問６　本文について正しく述べているものを，次の(ア)～(オ)から二つ選べ。

（ア）Research conducted within the Cabinet Office's technology promotion program is unique in such a way that it uses quantum computers as opposed to conventional ones.

（イ）In terms of the number of researchers as well as the investment made in research and development in quantum mechanics, Japan is behind to America or Europe.

（ウ）Quantum mechanics differs from Newtonian mechanics in such a way that it primarily deals with the motions of quite large objects such as planets and galaxies.

（エ）United States maintains a keen awareness of China as it succeeded, the first in the world, in a satellite conference employing quantum encryption methods.