

2022 年度 城西大学大学院理学研究科物質科学専攻

第一次入学試験問題

(2021 年 11 月 27 日)

外国語 (英語)

[解答上の注意]

1. 出題された問題 I ~ 問題IVの各問のすべてに解答しなさい。
2. 配点は合計 100 点とする。
3. 問題 I ~ IVのそれぞれにつき 1 枚の解答用紙に記入すること。問の番号とカッコ付番号は、各自で記入すること。
4. 解答欄の所定の欄に受験番号を記入すること。
5. 解答用紙は裏面を使ってもよい。

問題Ⅲ

次の英文を読み、問1～問5に答えなさい。

Electromagnetic waves are one of the key ways in which we can learn about the Universe. They are emitted and absorbed by all types of matter that are familiar from our everyday experience, and transmit energy between objects even across the vacuum of space. The most obvious form of electromagnetism is visible light. Ⓐ This is a very small part of the wider electromagnetic spectrum, which our eyes have evolved to respond to. There's nothing inherently special about it, but it was studies of the properties of (Ⓑ) light that led to our broader understanding of electromagnetism and the discovery of invisible radiations such as infrared, ultraviolet and X-rays.

The precise nature of electromagnetism, however, has always been problematic.
(Ⓒ)

In most situations, however, we can treat electromagnetic waves as self-sustaining fields that move across space as transverse waves, with their electrical and magnetic components perpendicular to each other, so that disturbance in the electric field reinforces the magnetic field, and vice versa. In a vacuum, these waves move at a speed of 299,792 kilometres per second. Ⓓ This speed is a natural constant called *c* that, remarkably, has proved to be the ultimate speed limit of the Universe. Because the speed of electromagnetic waves is constant, it's easy to see that their wavelength and frequency are intrinsically linked, and inversely proportional to one another — the longer the wavelength, the (Ⓔ) the frequency and vice versa. The amount of energy carried by a wave depends crucially on its frequency, with higher-frequency waves, such as X-rays, carrying more energy than visible light, and lower-frequency waves, such as infrared and radio waves, carrying less.

(注) inherently : 本質的に radiation : 輻射 problematic : 問題を含んでいる
self-sustaining : 自立している disturbance : 乱れ reinforce : 増強する
vice versa : 逆もまた同じ intrinsically : 本質的に

問1 下線部①を和訳しなさい。

問2 (㉔)に入る語句として最もふさわしいものを①～④の中からひとつ選びなさい。

- ①electromagnetic ②visible ③invisible ④wave-like

問3 (㉕)に入れるべき3つの文が順不同で以下の①～③に示されている。論理的な文章にするのに最もふさわしい配列を(①→②→③のように)答えなさい。

- ① The most intuitive way of reconciling these differences is to imagine light and other forms of electromagnetism as self-contained bundles or 'packets' of energy that encapsulate wave-like properties within them — but the reality is even stranger.
- ② But in certain circumstances it can behave as if it is made up of individual particles or photons.
- ③ In most situations and experiments, it displays the properties of a wave — for example it is subject to diffraction, refraction and interference.

問4 下線部②を和訳しなさい。

問5 (㉖)に適切な一語を入れなさい。

問題IV

問1 次の(1)～(5)について、下線を引いた語に対応する英語の語句(1単語とは限らない)を書きなさい。また、その語句を用いて和文を英訳しなさい。

- (1) 酸素は地球表面で最もありふれた元素の1つである。
- (2) 希ガスの反応性は非常に低い。
- (3) 一般的にイオン化合物の融点は高い。
- (4) 合成エタノールはエチレンの水和反応によって作られる。
- (5) 温度計を挿入し、温度上昇が止まるまで待ちなさい。