総合研究大学院大学高エネルギー加速器科学研究科
５年一貫制博士課程入学試験問題
英　語

令和４年１０月２５日（火）１１時２０分～１２時００分

注意

☆ 答案用紙の所定の欄に，受験番号，氏名を記入すること.

☆ 試験問題（２問）ごとに，異なった答案用紙を使用すること.

☆ 各問題に対して，答案用紙は複数使用してよいが，第○○問□□枚目というように，所定の欄に，選択した問題の番号及び答案用紙の順番を記入すること.

解答できない場合も，受験番号，氏名，問題番号を記入し，提出すること.

☆ 答案用紙がさらに必要な場合は，挙手をして監督者に知らせること.

第１問 次の英文は Steven Weinberg が若い科学者に送る Four golden lessons からの抜粋である．これを読み以下の問いに答えなさい．

My third piece of advice is probably the hardest to take. (a)It is to forgive yourself for wasting time. Students are only asked to solve problems that their professors (unless unusually cruel) know to be solvable. In addition, it doesn't matter if the problems are scientifically important — they have to be solved to pass the course. But in the real world, it's very hard to know which problems are important, and you never know whether at a given moment in history a problem is solvable. At the beginning of the twentieth century, several leading physicists, including Lorentz and Abraham, were trying to work out a theory of the electron. This was partly in order to understand why all attempts to detect effects of Earth's motion through the ether had failed. We now know that they were working on the wrong problem. At that time, no one could have developed a successful theory of the electron, because quantum mechanics had not yet been discovered. (1)It took the genius of Albert Einstein in 1905 to realize that the right problem on which to work was the effect of motion on measurements of space and time. This led him to the special theory of relativity. As you will never be sure which are the right problems to work on, most of the time that you spend in the laboratory or at your desk will be wasted. If you want to be creative, then you will have to get used to spending most of your time not being creative, to being becalmed on the ocean of scientific knowledge.

Finally, (b)learn something about the history of science, or at a minimum the history of your own branch of science. (2)The least important reason for this is that the history may actually be of some use to you in your own scientific work. For instance, now and then scientists are hampered by believing one of the over-simplified models of science that have been proposed by philosophers from Francis Bacon to Thomas Kuhn and Karl Popper. The best antidote to the philosophy of science is a knowledge of the history of science.

More importantly, the history of science can make your work seem more worthwhile to you. As a scientist, you're probably not going to get rich. Your friends and relatives probably won't understand what you're doing. And if you work in a field like elementary particle physics, you won't even have the satisfaction of doing something that is immediately useful. But you can get great satisfaction by recognizing that your work in science is a part of history.

ether: エーテル
becalmed: 凪で帆船が動けなくなる
antidote: 解毒薬

出典：Weinberg, S. Four golden lessons. *Nature* **426,** 389 (2003)

【問１】
下線部(1), (2)を日本語に訳しなさい.

【問２】
筆者は3つ目の助言として下線部(a)をあげている．その理由を本文の内容に沿って簡潔に日本語で説明しなさい.

【問３】
筆者は下線部(b)の理由を二つあげている．そのうち筆者がより重要と述べているものを簡潔に日本語で説明しなさい.

第２問 以下の和文を英訳しなさい.

【問１】

作用積分と確率振幅の対応を示唆する Dirac の教科書の謎めいた記述に触発され，当時大学院生だった Feynman は経路積分という素晴らしいアイデアを思いついたのです.

【問２】

私たちの宇宙は少なくとも素粒子レベルでは対称的ではありません．もし対称的ならば，宇宙誕生時に新たに生成された物質は同量の反物質と対消滅してしまって，何も残らなかったでしょう.

*ただし必要ならば以下を用いて良い.
作用積分: action integral (可算名詞)，確率振幅: probability amplitude (可算名詞)，経路積分: path integral (可算名詞), 物質: matter (不可算名詞), 反物質: antimatter (不可算名詞), 消滅させる: annihilate