1. What is philosophy of science? How is philosophy different from and related to science?

**Ans:** Philosophy of science is a sub-field of philosophy concerned with the foundations, methods, and implications of science. The central questions of this study concern what qualifies as science, the reliability of scientific theories, and the ultimate purpose of science. This discipline overlaps with metaphysics, ontology, and epistemology, for example, when it explores the relationship between science and truth.

There is no consensus among philosophers about many of the central problems concerned with the philosophy of science, including whether science can reveal the truth about unobservable things and whether scientific reasoning can be justified at all. In addition to these general questions about science as a whole, philosophers of science consider problems that apply to particular sciences (such as biology or physics). Some philosophers of science also use contemporary results in science to reach conclusions about philosophy itself.

The distinction between philosophy and science is very slim, but there are some differences nonetheless. Many people assume that science and philosophy are concepts contradictory to each other, but both subjects share a more positive relationship rather than an animosity.

Science can be defined as a study and understanding of natural phenomena. It is concerned with empirical data, meaning data that can be observed, tested, and repeated. It is systematic in nature, and there is a specific course of action used called the scientific method. Science bases its explanation on the results of experiments, objective evidence, and observable facts.

“Science” comes from the Latin word “scientia,” meaning “knowledge.”

There are many branches or fields of science. These branches can be classified under various headings: pure and applied sciences, physical and life sciences, Earth and space sciences. Also included in these classifications are exact science and descriptive science.

Science started out as a part of philosophy. It was then called natural philosophy, but science deviated from philosophy in the 17th century and emerged as a separate study or domain.

Science involves objective types of questions. As a study, it tries to find answers and prove them to be objective fact or truth. In its method, the experiment creates certain hypotheses that can be proven or validated as fact. In the same manner, hypotheses can also be wrong or falsified. By observing and undertaking an experiment, science produces knowledge through observation. Science’s main purpose is to extract the objective truth out of existing or naturally occurring ideas.

Science’s “predecessor,” philosophy, is a more difficult concept to define. It is broadly defined as an activity that uses reason to explore issues in many areas. Its application to many different fields makes it impossible for it to have a definite or concrete definition.

Philosophy tries to study and understand the fundamental nature of two things: the existence of man, and the relationship between man and existence. It also has many branches: metaphysics, logic, politics, epistemology, ethics, aesthetics, and specific philosophy in fields like philosophy of language, history, the mind, and religion, among others. “Philosophy” comes from the Greek word “philosophia,” which translates into “love of wisdom.”

Philosophy is based on reason; its methods utilize logical argumentation. Philosophy uses arguments of principles as the basis for its explanation. Philosophy entertains both subjective and objective types of questions. This means that aside from finding answers, it also resolves to generate questions. It raises questions and processes before finding out the answers. Philosophy is mostly involved with thinking and creating knowledge.

Or

Discuss some of the important consequences of the theory of relativity.

**Ans:** There are many consequences. Just to mention two:

One can solve Einstein’s equations of general relativity for an isotropic, homogeneous universe (which ours is at large scales) and get solutions for an expanding universe that depend on the density of matter and of dark energy (the cosmological constant).

We appear to be living with one such solution that currently has 32% of its mass-energy in matter (most dark, some ordinary) and dark energy at 68% of the total. And in a solution that is topologically flat at least to within 1/2 of one percent.

So the universe will keep expanding, and will do this forever.

A second consequence, and this is how general relativity was first verified. If you observe a star behind the edge of the Sun during an eclipse, then the gravitational field of the Sun will bend the light path. With general relativity the size of the deflection angle, the bend, is twice as large as with Newtonian gravity. This was confirmed by the Eddington eclipse expedition in 1919, only a few years after the 1915 date when Einstein first put forth the theory of general relativity. Which has survived every test thrown at it for 100 years now.

By the way Eddington was a big believer in the cosmological constant, which is the dark energy that is now observed to have a non-zero value and appears to take the simple form of a cosmological constant.

2. Make a critical analysis of the philosophical approach of logical positivism.

**Ans:** According to logical positivism, there are only two sources of knowledge: logical reasoning and empirical experience. The former is analytic a priori, while the latter is synthetic a posteriori; hence synthetic a priori does not exist.

The fundamental thesis of modern empiricism consists in denying the possibility of synthetic a priori knowledge.

Logical knowledge includes mathematics, which is reducible to formal logic. Empirical knowledge includes physics, biology, psychology, etc.

Experience is the only judge of scientific theories; however, logical positivists were aware that scientific knowledge does not exclusively rise from the experience: scientific theories are genuine hypotheses that go beyond the limits of finite human experience.

It is not possible to establish a logically durable building on verifications [a verification is an observational statement about immediate perception], for they are already vanished when the building begins. If they were, with respect to time, at the beginning of the knowledge, then they would be logically useless. On the contrary, there is a great difference when they are at the end of the process: with their help the test is performed... From a logical point of view, nothing depends on them: they are not premises but a firm end point.