

[This question paper contains 4 printed pages.]

8151

Your Roll No.

M.Ed.

A

Course – 4.5 – M.2

PRACTICAL ASPECTS OF SCIENCE EDUCATION

Time : 2 hours

Maximum Marks : 35

*(Write your Roll No. on the top immediately
on receipt of this question paper.)*

Answer three questions in all.

Question No. 1 is compulsory.

1. Discuss the major objectives and concerns of science education reflected in major commission reports.
(7½)
2. Generally, the conclusions/results of the experiments, that students are supposed to arrive at, are given in the books. How does this approach obstruct the learning of science? Answer this on the basis of your understanding of the method of science.
(7½)
3. Discuss at least four major differences between the science books developed under the Hoshangabad Science Teaching Programme and the science books that are generally used in schools.

P.T.O.

Taking two examples, explain this difference in the context of science as a discipline. (7½)

4. Read the following text and answer the questions in *your own words reflecting your understanding*.

William F. McComas discussed fifteen issues related to the Nature of Science that he considers problematic and calls them 'myths'. Read the Myth 10 and answer the questions :

**"MYTH 10 : EXPERIMENTS ARE THE PRINCIPAL
ROUTE TO SCIENTIFIC KNOWLEDGE**

Throughout their school science careers, students are encouraged to associate science with experimentation. Virtually all hands-on experiences that students have in science class are called experiments even if they would more accurately be labeled as technical procedures, explorations or activities. True experiments involve carefully orchestrated procedures accompanied by control and test groups. Usually experiments have as a primary goal the establishment of a cause and effect relationship. Of course, true experimentation is a useful tool in science, but is not the sole route to knowledge.

Many noteworthy scientists have used non-experimental techniques to advance knowledge. In

fact, in a number of science disciplines, true experimentation is not possible because of the inability to control variables. Many fundamental discoveries in astronomy are based on extensive observations rather than experiments. Copernicus and Kepler changed our view of the solar system using observational evidence derived from lengthy and detailed observations frequently contributed by other scientists, but neither performed experiments.

Charles Darwin's investigatory regime was frequently more similar to qualitative techniques used in the social sciences than the experimental techniques associated with the natural sciences. For his most revolutionary discoveries, Darwin recorded his extensive observations in notebooks annotated by speculations and thoughts about those observations. Although Darwin supported the inductive method proposed by Bacon, he was aware that observation without speculation or prior understanding was both ineffective and impossible. In fact he stated this view clearly by saying, "I could not help making hypotheses about everything I saw." (Darwin, 1958). The techniques advanced by Darwin have been widely used by scientists such as Goodall and Fossey in their primate studies. Scientific knowledge is gained in a variety of ways including observation, analysis, speculation, library investigation and experimentation."

- (a) (i) The author reflects upon various elements based on which the understanding of science of the general public is assessed. What are these elements and why do you think these reflect the understanding of science? (6)
- (ii) Discuss the reasons for the public's poor understanding of science. (6)
- (b) (i) Are experiments the only way to advance the knowledge of science? Why? (5)
- (ii) As per the author of this text, despite supporting the inductive method, what else was he aware of? Discuss. (3)