THE OPEN UNIVERSITY OF SRI LANAKA
BACHELOR OF TECHNOLOGY – LEVEL 05
FINAL EXAMINATION – 2009
MPJ5231 – NATURE OF SCIENCE
FOUR HOURS (ESSAY TYPE PAPER)
OPEN BOOK EXAMIANTON

Date: 30th March 2010 **Time: 0930 hr. – 1330hr.**

The questions are grouped in following manner.

Section A: 1-2
Section B: 3-7
Section C: 8-10

Please ensure that answers for questions in different sections are given on separate books. Mark your index number on each book.

Please answer a total of any six (6) questions only.

SECTION A

(1). (i). Why was the "ether" hypothesis was so important for the earlier "Mechanical world view(Newtonian)" which was replaced by Einsteinian world view?
(ii). What was the purpose of the Michaelson – Morley (M-M) experiment?
(iii). In the face of the null result of the above mentioned M-M experiment, what was the ad-hoc modification that was proposed?
(iv). Why Einstein did not need the above mentioned ad-hoc hypothesis in his Special Theory of Relativity?
(v). What was Einstein's starting point in the face of the above mentioned crisis in the "Mechanical (Newtonian) world view?
(vi). What was Einstein's position regarding the following?
(a). Time span between two events
(b). Simultaneity of two events
(c). Motion and rest of rigid bodies

(2). (i). Derive the (Lorentz) Relativistic velocity transformation formula for x and y directions

(ii). A man in a spaceship is travelling with velocity 0.8c relative to an observer on the earth. He fires a proton in the direction of travel at a velocity of 0.9c relative to the spaceship. Calculate the velocity of the proton relative to the observer on the earth using

(a). Relativistic velocity addition formula

(b). Galilean velocity addition formula.

(iii). (a). State the Length Contraction hypothesis and express it in symbolic form.

(b). State the Time Dilation hypothesis and express it in symbolic form.

(iv). Explain briefly the Twin Paradox.

SECTION B

(3). (i). Compare and contrast the views of Inductivists and Hypothesists regarding the following

(a). The method of science

(b). Theoretical terms

(ii). What is the basic difference between Empiricists and Rationalists?

(iii). Explain briefly as to how the problem raised by David Hume regarding the principle of induction affects causality (cause and effect relationship). Give an example to justify your answer.

(4). (i). Explain briefly the argument on verification in science used by Logical Positivists.

(ii). What is the problem with the above argument of Logical Positivists?

(iii). How did Karl Popper overcome the difficulties inherent in the above argument?

(v). Compare and contrast the views of Logical Positivists and Karl Popper regarding the following

(a). Observations in science (b). Theories

(5). (i). How did Karl Popper demarcate science from non-science?

(ii). Why did Popper reject ad-hoc modifications to theories?

(iii). Explain briefly the concept 'Verisimilitude' put forward by Popper to explain the progress of science.

(iv). What is the major drawback of the method of falsification?

(6). (i). How does Thomas Kuhn justify the 'Uniqueness of Science' among other areas of knowledge?

(ii). Explain briefly the background leading to a Scientific Revolution.

(iii). What is the role of scientific community during a Normal science period?

(iv). What is the relation between too successive paradigms? Explain.

(7). (i). Compare and contrast the views of Thomas Kuhn and Paul Feyerabend regarding the 'Uniqueness of Science' among other areas of knowledge.

(ii). State and examine Feyerabend's arguments for advocating anarchism (Anything Goes) regarding the methodology of science, citing Galileo's defense of Copernicus as an example.

SECTION B

(8). In many modern western medical practices there is a sharp division between the mind related and physical body related treatments.
Comment on the above distinction.

(9). What do you understand by the term 'reductionism" in modern science.
It is the popular view that 'Cloning', that is the creation of a child, by using the genetic material of only one parent will give an identical replica of the mother or father. Is this the actual situation? What does this portray about reductionism in the popular view of science?

(10.). Explain briefly the following critiques of modern science
(a). Feminist Critique
(b). Third World Critique
(c). New left critique

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