NATURAL SCIENCES TRIPOS Part II

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1 June 2007 9.00 to 12.00

HISTORY AND PHILOSOPHY OF SCIENCE (1)

Classical Traditions in the Sciences

Before you begin read these instructions carefully:

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Paper 1: Classical Traditions in the Sciences

SECTION A

1. Under what conditions, and within what limits, is it possible to make meaningful comparisons between the sciences of different ancient cultures?

2. What motivated the development of mathematics in ancient and pre-modern cultures?

3. How does the survival of evidence affect what we know about the ancient and pre-modern sciences?

SECTION B

4. Compare the motives for observing the heavens in Egypt and Mesopotamia.

5. **Either** (a) Why would an ancient author writing about a scientific topic choose to write a poem rather than a prose text?

   Or (b) What does the study of genre tell us about ancient science?

6. How trustworthy are ancient biographies of scientists?

7. How did political and ideological factors influence the agendas of ancient Greek and Chinese scientists?

8. How did early modern natural philosophers learn about the ancient sciences?

9. Was Arabic science derivative or innovative?

10. What did Renaissance images and maps make visible?

11. Discuss the relationships between books and instruments in medieval Europe.

12. Are ‘science’ and ‘religion’ useful categories for understanding natural philosophy in medieval and early modern Europe?

END OF PAPER

NATURAL SCIENCES TRIPOS Part II

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31 May 2007 1.30 to 4.30

HISTORY AND PHILOSOPHY OF SCIENCE (2)

Natural Philosophies: Renaissance to Enlightenment

Before you begin read these instructions carefully:

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Paper 2: Natural Philosophies: Renaissance to Enlightenment

SECTION A

1. "Perhaps the cleavage between the mathematical and experimental sciences still remains, rooted in the nature of the human mind" (T.S. KUHN). Does the development of the sciences between 1600 and 1800 support this claim?

2. "Many will travel and knowledge will be increased." Discuss the importance of this statement for early modern natural philosophy and natural history.

3. How, if at all, did scientific societies and academies matter to the history of the sciences between 1600 and 1800?

SECTION B

4. **Either** (a) What was the significance of the institutional settings of early modern astronomy?

   Or (b) Did the advent of printing bring about the end of script culture in early modern Europe?

5. "The birth of the reader must be at the cost of the death of the author" (ROLAND BARTHES). Assess this statement with reference to book production and book consumption in early modern Europe.

6. Who used instruments in early modern Europe?

7. **Either** (a) What did Newton's contemporaries find remarkable about him and why?

   Or (b) "If I have seen further, it is by standing on the shoulders of giants" (ISAAC NEWTON). Did Newton's eighteenth-century successors see further by "standing on his shoulders"?

8. Why was the classification of living beings a contentious issue in the eighteenth century?

9. What was the political background to the Kangxi emperor's attitude to Western learning?

10. How did Linnaeus's and Buffon's accounts of species exemplify their approaches to natural history?

11. How did the significance of the laboratory as a site of experimental work change between 1600 and 1800?

12. What was the commercial significance of eighteenth-century cabinets and collections?

END OF PAPER

NATURAL SCIENCES TRIPOS Part II

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30 May 2007 9.00 to 12.00

HISTORY AND PHILOSOPHY OF SCIENCE (3)

Science, Industry and Empire

Before you begin read these instructions carefully:

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Paper 3: Science, Industry and Empire

SECTION A

1. How did men of science establish their authority in the nineteenth century?

2. In what types of locale were the sciences practised in the nineteenth century?

3. "The nineteenth century was the great age of nationalism, and its science can be understood only in its particular national contexts." Discuss.

SECTION B

4. "At each increase of knowledge, as well as on the contrivance of every new tool, human labour becomes abridged" (CHARLES BABBAGE). Did the work of Victorian scientists offer any help to Victorian manufacturers?

5. Why did nineteenth-century German states support the work of astronomers and physicists?

6. Is the distinction between monogenists and polygenists central to understanding the debates over race in the nineteenth century?

7. **Either** (a) What was the significance of the establishment of the Physikalisch-Technische Reichsanstalt for the development of German sciences?

   Or (b) "You are now seeing the regal lodgings which have been prepared for physiology, the queen of the sciences: one of those state institutions which are a symbol of the present age, institutions of which neither the highest culture of Antiquity with its temples and amphitheatres nor that of the Renaissance with its temples and palaces had even the slightest inkling" (EMIL DU BOIS-REYMOND, 1877). Why was such a grand institute built for physiology?

8. **Either** (a) What role did scientific instruments play in the activities of nineteenth-century museums?

   Or (b) To what extent did developments in the nineteenth-century physical sciences depend on new scientific instruments?

9. Did the popularization of science make science more authoritative?

10. Why did Thomas Henry Huxley disdain describing himself as a scientist?

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Paper 3: Science, Industry and Empire (cont.)

11. What can the following stanzas from Alfred Tennyson's *In Memoriam* tell us about the public's perception of science in Victorian Britain?

I stretch lame hands of faith, and grope,
And gather dust and chaff, and call
To what I feel is Lord of all,
And faintly trust the larger hope.

"So careful of the type?" but no.
From scarped cliff and quarried stone
She cries, "A thousand types are gone:
I care for nothing, all shall go".

…

The hills are shadows, and they flow
From form to form, and nothing stands;
They melt like mist, the solid lands,
Like clouds they shape themselves and go.

12. In what senses might Michael Faraday be described as a self-made man?

END OF PAPER

NATURAL SCIENCES TRIPOS Part II

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1 June 2007 1.30 to 4.30

HISTORY AND PHILOSOPHY OF SCIENCE (4)

Metaphysics, Epistemology and the Sciences

Before you begin read these instructions carefully:

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Paper 4: Metaphysics, Epistemology and the Sciences

SECTION A

1. What should scientists believe?

2. Should an anti-realist scientist and a realist scientist practise science differently?

3. Does the disunity of the sciences preclude a general philosophy of science?

SECTION B

4. **Either** (a) Do laws describe how things *must* behave?

   Or (b) Is to explain simply to cite a cause?

5. Are there good reasons for rejecting the view that a proper name is an abbreviated or disguised definite description?

6. Was it an *empirical* discovery that water is H_2O?

7. What is the best solution to the tautology problem in the philosophy of biology?

8. "Henceforth space by itself, and time by itself, are doomed to fade away into mere shadows, and only a kind of union of the two will preserve an independent reality" (HERMANN MINKOWSKI). Discuss.

9. To what extent is Thomas Kuhn's concept of the exemplar simply an imaginative development of an idea familiar from both inside and outside the sciences, namely reasoning from case to case?

10. "Logical positivism … is dead, or as dead as a philosophical movement ever becomes" (JOHN PASSMORE). Dead, or only resting?

11. "'The true', to put it very briefly, is only the expedient in the way of our thinking" (WILLIAM JAMES). Discuss.

12. **Either** (a) Can we know whether induction is reliable?

    Or (b) Does every observation compatible with a hypothesis also confirm it?

END OF PAPER

NATURAL SCIENCES TRIPOS Part II

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1 June 2007 9.00 to 12.00

HISTORY AND PHILOSOPHY OF SCIENCE (5)

Science and Technology Studies

Before you begin read these instructions carefully:

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Paper 5: Science and Technology Studies

SECTION A

1. Should natural scientists receive training in the sociology of knowledge? Would such training enable them to produce better science?

2. Can sociologists of STM (science, technology, and medicine) and bioethicists learn from one another?

3. "Users create technologies." Discuss.

SECTION B

4. "If all others contribute to the accumulation of environmental harm it makes no difference whether or not I do so." Discuss.

5. "To recognise the political dimensions in the shapes of technology does not require that we look for conscious conspiracies or malicious intentions" (LANGDON WINNER). What, if anything, is political about technology?

6. "Discovery is not about coming first." Discuss.

7. Should the regulation of genetic information be of special ethical concern?

8. "It is scarcely possible to think of the practicability of artificially fertilizing domestic animals, without extending in imagination its application to humanity" (FRANCIS GALTON). Discuss.

9. "The history of reproductive technologies is, essentially, the history of a male takeover of women's powers." Discuss.

10. Can groups be persons?

11. Is the distinction between theory and practice a useful one for the social sciences?

12. In what ways, if at all, is the "communication circuit" a useful analytical tool?

END OF PAPER

NATURAL SCIENCES TRIPOS Part II

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30 May 2007 9.00 to 12.00

HISTORY AND PHILOSOPHY OF SCIENCE (6)

History and Philosophy of Mind

Before you begin read these instructions carefully:

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Paper 6: History and Philosophy of Mind

SECTION A

1. Is psychology a natural science?

2. Is Kripke's work on the mind less empirical than Freud's?

3. Is the mind a machine?

SECTION B

4. Is the identity of mental states and brain states any more problematic than the identity of temperature and mean kinetic energy?

5. Is there any sense in which meanings *are* in the head?

6. Are meaning attributions truth-apt?

7. Is there a convincing response to the meaning scepticism developed in Kripke's interpretation of Wittgenstein?

8. Does a rock implement every computation?

9. Can a unitary (generic) concept of hallucination be defended? Discuss the problem in historical terms.

10. **Either** (a) "The psychoanalytic concept of the unconscious is different from the neuroscientific, the linguistic or the sociological unconscious because it is so closely bound to the practice of the daily interpretation of patients' speech." Discuss.

    Or (b) "Infantile sexuality is the empirical foundation of psychoanalysis, but is either unobservable or unpalatable or both. As Freud said, 'If mankind had been able to learn from a direct observation of children, these three essays [on the theory of sexuality] could have remained unwritten' (1920)." Discuss.

11. "The rise and fall of psychoanalysis was the last battle in the nineteenth-century warfare between science and religion." Discuss.

12. Discuss the significance of genealogical method, from Galton onwards, in the history of British psychology.

END OF PAPER

NATURAL SCIENCES TRIPOS Part II

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4 June 2007 1.30 to 4.30

HISTORY AND PHILOSOPHY OF SCIENCE (7)

Medicine from Antiquity to the Enlightenment

Before you begin read these instructions carefully:

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Paper 7: Medicine from Antiquity to the Enlightenment

SECTION A

1. How important were institutions to medical practice before 1750?

2. What was the role of advice in Western medicine before 1750?

3. Discuss the interactions between medicine and religion in pre-modern Europe.

SECTION B

4. **Either** (a) What are the strengths and weaknesses of the professional corpora (i.e. therapeutic and diagnostic tablets) as sources for Mesopotamian medicine?

   Or (b) Which among the modern approaches to Mesopotamian medicine do you find most valuable and why?

5. What role did rulers play in the acquisition of medical knowledge during the Hellenistic period?

6. "The main difference between the naturalist and the supernaturalist medical traditions in Greek antiquity lies in the greater readiness in some of the naturalists to admit their own helplessness in the face of acute disease." Discuss.

7. What assumptions were made about mental illness in Greco-Roman antiquity and what resources were available to treat it?

8. Is it useful to distinguish between magic and medicine when studying medieval medicine?

9. "The development of midwifery licensing in the 15th-17th centuries was an attempt to bring the wholly female world of childbirth into the hands of male practitioners." Discuss.

10. "Medical ideas changed, medical practices stayed the same." Evaluate this statement with reference to healthcare in early modern Europe.

11. What roles did visual images play in medical communication from 1349 to 1641?

12. Assess the impact of the plague upon medical theories and practices in early modern Europe.

END OF PAPER

NATURAL SCIENCES TRIPOS Part II

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2 June 2007 9.00 to 12.00

HISTORY AND PHILOSOPHY OF SCIENCE (8)

Modern Medicine and Biomedical Sciences

Before you begin read these instructions carefully:

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Paper 8: Modern Medicine and Biomedical Sciences

SECTION A

1. "Have we lost faith?" "Certainly not", answered the playwright George Bernard Shaw in the early twentieth century, "but we have transferred it from God to the General Medical Council." Discuss the history of medical authority in the light of Shaw's claim.

2. "The science that matters in the history of modern medicine is experimental, laboratory science." Discuss.

3. "People create their own diseases." Does the history of modern medicine support this claim?

SECTION B

4. Have medical historians exaggerated the general significance of early nineteenth-century innovations in the Paris hospitals?

5. "The connection of scarcity and privation with the occurrence of fever among the lower classes of the community has been so often verified by the experience of epidemics, as now to be received as a general axiom" (ALEXANDER TWEEDIE, 1830). How, then, did Edwin Chadwick come to re-define public health as a matter of drains and sewage?

6. "Medical theory, surgical practice." Would that be an accurate summary of the difference between medical and surgical therapeutics in the nineteenth century?

7. "If, even now, we say that each human individual develops from an egg, the only answer, even of most so-called educated men, will be an incredulous smile; if we show them the series of embryonic forms developed from this human egg, their doubt will, as a rule, change into disgust. Few educated men have any suspicion of the fact, that these human embryos conceal a greater wealth of important truths, and form a more abundant source of knowledge than is afforded by the whole mass of most other sciences and of all so-called 'revelations'" (ERNST HAECKEL, 1874). Discuss.

8. How did the making of penicillin during World War II both build on and differ from the earlier production of Salvarsan and insulin?

9. "The victory of biological psychiatry in the second half of the twentieth century proved that the anti-psychiatrists were right to argue that the concept of a 'mental illness' is a contradiction in terms." Discuss.

10. What is 'post' about post-colonial medicine?

PLEASE TURN OVER/

Paper 8: Modern Medicine and Biomedical Sciences (cont.)

11. “Any inquiry into the sexual lives of subjects under observation is incompatible with scientific objectivity” (GEORGES BATAILLE on the Kinsey report). Discuss.

12. Explain how, and with what consequences, the reporting of medical news has been transformed in the last 50 years.

END OF PAPER

NATURAL SCIENCES TRIPOS Part II

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31 May 2007 9.00 to 12.00

HISTORY AND PHILOSOPHY OF SCIENCE (9)

Images of the Sciences

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Paper 9: Images of the Sciences

SECTION A

1. Should history of science play a role in the education of scientists?

2. Can science ever be free of politics?

3. How has the philosophy of science been affected by developments in the sciences?

SECTION B

4. **Either** (a) "The study of the past with one eye, so to speak, upon the present is the source of all the sins and sophistries in history" (HERBERT BUTTERFIELD, *The Whig Interpretation of History*, 1931). Discuss.

   Or (b) Has the development of science been a continuous process? Discuss with respect to the views of a range of mid-twentieth-century historians of science.

5. Is scientific theorizing aimed at the discovery of truths about the world? Discuss in relation to the philosophies of science of Ernst Mach and Pierre Duhem.

6. Are evolutionary models of scientific change accurate? Are they useful?

7. How might Michel Foucault's theory of 'power' affect views of the sciences?

8. "Science as Communism. — Already we have in the practice of science the prototype for all human common action. … In its endeavour, science is communism. In science men have learned consciously to subordinate themselves to a common purpose without losing the individuality of their achievements" (J.D. BERNAL, *The Social Function of Science*, 1939). Is this a plausible view of science, and of communism?

9. What are the strengths and weaknesses of Boris Hessen's interpretation of the Scientific Revolution?

10. In what sense is Hume a realist concerning causation?

11. Discuss Kant's account of mathematical knowledge.

12. Do scientific photographs show what really happened?

END OF PAPER