

NST2HP  
Natural Sciences Tripos Part II: History and Philosophy of Science

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Wednesday 28 May 9.00am to 12.00pm

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### **Paper 1**

#### **Science Before 1650**

*You should answer four questions in total. Answer **one** question from Section A and **three** questions from Section B. All questions carry equal weighting.*

*Begin each answer on a separate sheet.*

*Write legibly and on only **one** side of the paper.*

*Answers must be tied up in separate bundles, marked 1, 2, 3, etc. according to the number of the question.*

*Attach a completed coversheet to each bundle and complete a master coversheet listing all questions attempted. It is essential that you write your examination number and **not** your name on the coversheet and on **each** bundle.*

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## SECTION A

1. "All men by nature desire to know" (Aristotle). Does the history of science up to 1650 bear this out?
2. Can one meaningfully talk of the practice of science in the Ancient and/or Medieval periods?
3. "Ancient authority was only an excuse to justify personal agendas." Discuss.

## SECTION B

4. "Ancient Greek science triumphed by rejecting the traditional myths." Discuss.
5. How did ancient natural philosophers and/or mathematicians engage with the ideas and methods of their predecessors?
6. How did instruments provide tangible models of astronomical knowledge in the medieval period?
7. What were the differences between how nature was studied inside and outside of the universities in the centuries around 1500?
8. Grant versus Cunningham on the identity of natural philosophy: is it just a case of two bald men fighting over a comb? Or are there significant issues involved for the historian of science?
9. Was increasing accuracy the most significant characteristic of early modern representations of nature?
10. How and why did nature become important in early modern Europe? Answer this in relation to two or more of the following areas: politics, religion, commerce.
11. The survival of books and instruments from before 1650 can be patchy. What problems does this present for a historian of instruments?

**END OF PAPER**

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Natural Sciences Tripos Part II: History and Philosophy of Science

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Monday 2 June

9.00am to 12.00pm

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## Paper 2

### Early Medicine

*Students taking **History and Philosophy of Science** should answer **FOUR** questions. Answer **one** question from Section A and **three** questions from Section B. All questions carry equal weighting.*

*Students taking **Biological and Biomedical Sciences** should answer **THREE** questions, all of them chosen from Section B. Do not answer any questions from Section A.*

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## SECTION A

1. How and why did medical knowledge change in medieval and early modern Europe?
2. Discuss the changes and continuities in medical practice between 1100 and 1750.
3. Is it possible to recover patients' experiences of illness and healing in medieval and early modern Europe?

## SECTION B

4. Is it right to talk about the medieval development of scholastic medicine as a radical shift from practical to theoretical concerns?
5. Was women's medicine a distinct body of knowledge and/or practice in medieval Europe?
6. Can we distinguish between secular and religious healing in the Middle Ages?
7. Does it make sense to think of medical practitioners in the Middle Ages as constituting a hierarchy (i.e. physicians, surgeons, apothecaries, empirics of all kinds)?
8. To what extent were ideas about the maintenance of health stable through the sixteenth and seventeenth centuries? How might we explain this stability?
9. Was it possible to cure new diseases in early modern Europe?
10. Evaluate the role of religion in the ways in which early modern people experienced illness and healing.
11. Were sickness and death gendered experiences in early modern Europe?

**END OF PAPER**

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### **Paper 3**

#### **Sciences in Transition: Renaissance to Enlightenment**

*You should answer four questions in total. Answer **one** question from Section A and **three** questions from Section B. All questions carry equal weighting.*

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## SECTION A

1. What role did new institutions play in the study of nature in early modern Europe?
2. What role did religion play in early modern Europeans' pursuit of natural knowledge?
3. "Every great work of thought is an argument. To understand it, we need to know who the argument is with." Is this a fruitful way of thinking about the Enlightenment?

## SECTION B

4. Why was astrology the pre-eminent occult science in sixteenth and seventeenth century Europe?
5. What role did the notion of "experience" play in early modern natural philosophy?
6. Why was alchemy practised by both charlatans and by natural philosophers in early modern Europe?
7. To what extent was early modern astronomy pursued because of interests in navigation?
8. Was Isaac Newton a Newtonian?
9. How did Linnaeus reform natural history?
10. Why was there support for scientific expeditions in the eighteenth century?
11. When and why did the term "evolution" enter natural history?

**END OF PAPER**

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Natural Sciences Tripos Part II: History and Philosophy of Science

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Wednesday 28 May 1.30pm to 4.30pm

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## **Paper 4**

### **Science, Industry and Empire**

*You should answer four questions in total. Answer **one** question from Section A and **three** questions from Section B. All questions carry equal weighting.*

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## SECTION A

1. It is often said that scientific knowledge is made in private and then communicated to the public. Discuss, using examples from the history of nineteenth-century sciences.
2. Compare and contrast the laboratory, the field and the museum as sites of nineteenth-century science.
3. Using examples from a variety of disciplines, discuss how the introduction of new kinds of instruments affected the development of nineteenth-century science.

## SECTION B

4. Was the telegraph more important to science, industry or empire?
5. How did metropolitan science contribute to empire building, and vice versa?
6. What was at stake socially and politically in the debates in nineteenth-century Britain over the origin of new species?
7. Why was science closely linked with ideals of economic free trade in the nineteenth century?
8. Why did establishing uniform standards become such a significant aspect of scientific practice in the nineteenth century?
9. "In the last few decades physics has grown out of its formerly very modest place into a recognized position of the first rank. If one were to analyze the motives which have led governments to approve many millions for physics institutes, then the effective motive would prove to be the connection of physical research with technology" (Friedrich Kohlrausch, 1896). Why did nineteenth-century governments fund physics?
10. In what ways was the nineteenth-century faith in the progress of European civilization supported by attitudes towards evolutionary science?
11. If science was not "professional" during most of the nineteenth century in Britain, to what extent does that mean that it was "amateur"?

**END OF PAPER**

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Natural Sciences Tripos Part II: History and Philosophy of Science

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Monday 2 June

1.30pm to 4.30pm

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## Paper 5

### Modern Medicine and Biomedical Sciences

Students taking **History and Philosophy of Science** should answer **FOUR** questions. Answer **one** question from Section A and **three** questions from Section B. All questions carry equal weighting.

Students taking **Biological and Biomedical Sciences** should answer **THREE** questions, all of them chosen from Section B. Do not answer any questions from Section A.

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## SECTION A

1. To what extent did change originate within nineteenth and twentieth-century medicine, and to what extent from without?
2. What, if anything, is or was *modern* about modern medicine?
3. "The important question has not been whether to apply science in medicine, but what kind of science to apply." Discuss with respect to medicine since 1800.

## SECTION B

4. Historians of medicine often claim that modern hospital medicine started in Paris around 1800. Were transformations around 1900 even more significant?
5. In the nineteenth century, what kinds of medical work were considered suitable for women, and what kinds for men, and why?
6. "Anatomy merely describes what is there, but physiology allows medicine to intervene." Assess this claim in relation to nineteenth-century medicine.
7. Which would be more useful: a history of germ theories or a history of germ practices? Discuss with respect to surgery AND/OR tropical medicine.
8. How did the production of scientific drugs change between 1870 and 1970?
9. "The history of reproduction is a history of ever increasing medical and state control." Assess this claim for the period since 1800.
10. When did patients become consumers? Back up your argument with examples.
11. What roles have human health concerns played in environmental and/or global politics?

**END OF PAPER**

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Natural Sciences Tripos Part II: History and Philosophy of Science

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Monday 2 June

9.00am to 12.00pm

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## **Paper 6**

### **Metaphysics, Epistemology and the Sciences**

*You should answer four questions in total. Answer **one** question from Section A and **three** questions from Section B. All questions carry equal weighting.*

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## SECTION A

1. Are laws of nature overrated?
2. Why does it matter whether science has progressed?
3. "It is within science itself, and not in some prior philosophy, that reality is to be identified and described" (W.V.O. Quine). Discuss.

## SECTION B

4. Must explanation provide understanding?
5. What does the practice of modelling teach us about laws?
6. Is there anything distinctive about biological causation?
7. Can scientific revolutions be rational? Discuss with relation to Kuhn.
8. Do species have: a) intrinsic essences, b) historical essences, or c) neither?
9. What fixes the meaning of scientific terms?
10. What is the relationship between the biological function of an organ and its evolutionary history?
11. What work do idealisations and abstractions perform in science?

**END OF PAPER**

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Thursday 29 May 9.00am to 12.00pm

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### **Paper 7**

#### **Ethics and Politics of Science, Technology and Medicine**

*You should answer four questions in total. Answer **one** question from Section A and **three** questions from Section B. All questions carry equal weighting.*

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## SECTION A

1. Should science be liberated from ethical and political concerns?
2. Are scientists the only people who have the authority to interpret scientific claims?
3. Is there a useful distinction between pure scientific research and its applications?

## SECTION B

4. Do the sciences and humanities constitute two independent cultures?
5. Does Longino provide a plausible account of how to overcome bias in scientific research?
6. "For every expert, there is an equal and opposite expert" (Geoff Holder). If that is true, how can science assist a court in determining a proper outcome?
7. How does science sell magazines?
8. Should sociology of science give the same kind of explanation for successful and for unsuccessful knowledge claims?
9. When, if ever, are health inequalities unjust?
10. Is the distinction between treatment and enhancement morally relevant?
11. How might debates over informed consent in medicine illuminate other cases of expert/non-expert interaction?

**END OF PAPER**

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Natural Sciences Tripos Part II: History and Philosophy of Science

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Saturday 31 May      9.00am to 12.00pm

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**Paper 8**

**History and Philosophy of the Physical Sciences**

*You should answer four questions in total. Answer **one** question from Section A and **three** questions from Section B. All questions carry equal weighting.*

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## SECTION A

1. Has the creation of distinct disciplines or fields led to increasing discontinuity in the physical sciences?
2. To what extent has the development of the physical sciences been determined by contributions from unique and outstanding individuals?
3. "A theory of matter is a policy, not a creed" (J. J. Thomson, 1907). Is this statement confirmed by the history of the physical sciences?

## SECTION B

4. Is the quantum mechanical description of physical reality complete?
5. Did Einstein's strategies in developing quantum theory and relativity differ markedly?
6. How has meteorology changed since 1500?
7. Is astronomy an experimental science?
8. Why do physicists trust their instruments?
9. To what extent has underdetermination been a problem in the history of chemistry?
10. Does realism require that we believe what modern physics tells us?
11. Has it always been the case that chemistry is independent of physics?

**END OF PAPER**

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Natural Sciences Tripos Part II: History and Philosophy of Science

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Wednesday 28 May 9.00am to 12.00pm

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## **Paper 9**

### **History of Philosophy of Science**

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## SECTION A

1. To what extent have new scientific theories given rise to new questions for philosophers of science?
2. Why should philosophers of science study the history of their subject?
3. Is empiricism compatible with scientific realism? Justify your answer with reference to at least two major thinkers in the history of philosophy of science.

## SECTION B

4. Are Locke's arguments against "innate ideas" convincing?
5. Does Berkeley refute "scepticism, atheism and irreligion"?
6. "The idea of space is nothing but a copy of these colour'd points, and of the manner of their appearance" (Hume). Discuss.
7. "Experience is possible only through the representation of a necessary connection of perception" (Kant). Discuss in relation to Hume's analysis of causation.
8. How did Kant relate his critical philosophy to the natural sciences? Discuss with relation to either Newtonian mechanics or the study of living beings.
9. Does scientific theory aim at truths about the world? Discuss the positions of Duhem and Mach on this issue.
10. "There is no sense in which it is possible to 'separate out' the conventional aspects of science from the non-conventional, empirical aspects." Discuss in relation to at least two of the following philosophical approaches: (a) Poincaré's conventionalism; (b) the Vienna Circle; (c) early American pragmatism; (d) Quine and/or Putnam.
11. Compare the positivism of Comte and Mill with that of the Vienna Circle.

**END OF PAPER**

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Natural Sciences Tripos Part II: History and Philosophy of Science

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Friday 30 May 9.00am to 12.00pm

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## **Paper 11**

### **Science and Technology Since 1900**

*You should answer four questions in total. Answer **one** question from Section A and **three** questions from Section B. All questions carry equal weighting.*

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## SECTION A

1. Patterns of funding in the sciences changed significantly in the twentieth century. Describe two examples of such change, assessing their causes and identifying their effects on research.
2. Was there such a thing as “twentieth-century science”?
3. “The history of science and technology since 1900 is best studied at the level of the nation.” Discuss.

## SECTION B

4. Addressing the First International Congress of Physics in 1900, Alfred Cornu stated: “in the terrain of pure science rivalries, elsewhere so cruel, are resolved through a generous competition always profitable to humanity”. Discuss.
5. How and to what extent did biologists change everyday life between 1900 and 1945?
6. To whom was “basic science” an important concept in the twentieth century, and why?
7. To what extent did the success of the laboratory sciences before 1945 depend on achievements outside their walls?
8. What audiences were there for research in the physical sciences after 1945, and how did these audiences shape them?
9. “In China, science walks on two legs.” Discuss the significance of this statement to the history of twentieth-century science.
10. How did digital electronic computers affect the sciences after 1945? Answer with reference to at least two different areas of research.
11. Compare and contrast changes in the physical and biological sciences since 1970, and explain the factors contributing to these changes.

**END OF PAPER**