PHT2/7

PHILOSOPHY TRIPOS Part II

Tuesday 30 May 2006 9 to 12

Paper 7

MATHEMATICAL LOGIC

Answer **three** *questions only.*

Write the number of the question at the beginning of each answer. If you are answering the either/or question, indicate the letter as well.

STATIONERY REQUIREMENTS
20 Page Answer Book x 1
Rough Work Pad

You may not start to read the questions printed on the subsequent pages of this question paper until instructed that you may do so by the Invigilator

1 Compare and contrast first-order and second-order logic.

2 Is second-order discourse about all sets permissible?

3 'Axiomatizing set theory leads to a relativity of set-theoretic notions' (Skolem). Discuss.

4 Show that categorical theories are complete. Outline which first-order theories are categorical, explaining how treating identity as a logical constant affects the situation.

5 Does the iterative conception of set resolve Russell's paradox?

6 Develop an account of the arithmetic of transfinite ordinals. Discuss examples of arithmetical laws that generalise to the transfinite case, and examples of laws that do not.

7 Is the axiom of choice true?

8 Outline carefully one proof of Gödel's First Incompleteness Theorem. Comment on the presuppositions of your proof.

9 **Either** *(a)* 'We can hope that arithmetic is consistent, but we cannot hope to prove it is.' Discuss.

Or *(b)* 'Gödel's Second Theorem conclusively shows that Hilbert's Programme fails.' Discuss.

10 'Church's Thesis is in principle refutable but not provable.' Discuss.

END OF PAPER