

## 2009 Paper 6 Question 7

### Logic and Proof

(a) What is an S4 modal frame? [2 marks]

(b) For each of the following formulae of S4 modal logic, present either a sequent calculus proof or a falsifying interpretation.

(i)  $(\Diamond(P \rightarrow Q) \wedge \Box P) \rightarrow \Diamond Q$  [6 marks]

(ii)  $\Box(P \vee Q) \rightarrow (\Box P \vee \Diamond Q)$  [6 marks]

(iii)  $(\Diamond\Box P \wedge \Diamond\Box Q) \rightarrow \Diamond(P \wedge Q)$  [6 marks]