



PHI 2001 Logic

9.15 – 11.15

Saturday 4<sup>th</sup> February 2012

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A list of logical rules is appended to this examination paper to assist candidates.

Answer all questions.

- 1) (i)  $a*b$  is defined as  $(a \vee b) \vee \neg(a \wedge b)$ . Work out its *truth-table*. (3 marks)  
(ii) Show that the *truth-table* of  $\neg(a \wedge \neg b) \vee \neg(b \wedge \neg a)$  is the same as that of  $a*b$ . (3 marks)  
(iii) Show by means of a *truth-table*, that  $\vee$  is distributive over  $\rightarrow$ , i.e. that  $a \vee (b \rightarrow c) \succ (a \vee b) \rightarrow (a \vee c)$  is valid. (5 marks)  
(iv) By means of a *truth-table*, found out whether the implication:  $\neg(A \wedge B), \neg A < B$  is valid. (4 marks)
- 2) Find out by means of *effective scenario tableaux* whether the arguments:  
(i)  $\neg a \vee b < a \rightarrow b$   
(ii)  $\neg(a \wedge b) < \neg a \vee \neg b$   
are effectively sound. (8 marks each)
- 3) Given that  $a$  and  $b$  are truth-indefinite primary propositions, find out by means of *dialogues* whether the arguments:  
(i)  $\neg(a \wedge b), a < \neg b$   
(ii)  $a \wedge (b \vee c) < (a \wedge b) \vee (a \wedge c)$   
are effectively and/or classically sound. (8 marks each)
- 4) Find out by means of *dialogue-based developments* whether the propositions/arguments:  
(i)  $\neg(a \wedge \neg a)$   
(ii)  $\neg(\neg a \vee \neg b) < a \wedge b$   
are effectively and/or classically true/sound. (6 marks each)
- 5) Within classical logic, ‘proposition  $A$  is *contrary* to proposition  $B$ ’ means that  $A < \neg B$  is sound. What do the following mean? (1 mark each)  
(i)  $A$  is *subcontrary* to  $B$   
(ii)  $A$  is *contradictory* to  $B$
- 6) Write down: (1 mark each)  
(i) the contrary, if any, of “All men are wise”;  
(ii) the subcontrary, if any, of “All men are wise”;  
(iii) the contradictory, if any, of “All men are wise”;  
(iv) the subaltern, if any, of “All men are wise”;  
(v) the superaltern, if any, of “All men are wise”.
- 7) Give the simple and/or accidental converse, if any, of:  
(i) Some man is wise.  
(ii) Some man is not wise. (2 marks each)

- 8) Show by means of two *Beth Tableaux* that the a-type proposition  $SaP [\bigwedge_x .S(x) \rightarrow P(x).]$  is classically contradictory to the o-type proposition  $SoP [\bigvee_x .S(x) \wedge \neg P(x).]$ , i.e. that (i)  $SaP < \neg SoP$  and (ii)  $\neg SoP < SaP$  are both classically sound. (5 marks each)
- 9) Show by means of a *Beth tableau* that, if the subject term S is occupied, the proposition  $SaP$  is accidentally convertible to the proposition  $PiS$ , i.e. that  $\bigvee_x S(x) \text{ ,, } SaP < PiS$ . (8 marks)
- 10) Show by means of a *Beth tableau* that the 2<sup>nd</sup> figure syllogism *Baroco* is classically sound. (12 marks)