UNIVERSITY OF MALTA
FACULTY OF ARTS

JANUARY 2011 SESSION EXAMINATIONS

PHI 2001 Logic

11.45 – 13.45 **Tuesday 8th February 2011**

NO DICTIONARIES ALLOWED

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

1) (i) $a \leftrightarrow b$ is defined as $\neg (a \vee b) \vee (a \wedge b)$. Work out its truth-table. *(3 marks)*
(ii) Show that the truth-table of $\neg(a \wedge \neg b) \wedge \neg(b \wedge \neg a)$ is the same as that of $a \leftrightarrow b$. *(3 marks)*
(iii) By means of a truth-table, find out whether $\wedge$ is distributive over $\rightarrow$, i.e. whether $a \wedge (b \rightarrow c) >< (a \wedge b) \rightarrow (a \wedge c)$ is valid. *(5 marks)*
(iv) Show by means of a truth-table that the Disjunctive Syllogism is valid, i.e. that $A \vee B,, \neg A < B$. *(4 marks)*

2) Find out by means of *effective scenario tableaux* whether the arguments:
(i) $\neg(a \vee b) < \neg a \wedge \neg b$
(ii) $a \wedge (b \vee c) < (a \wedge b) \vee (a \wedge c)$
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) $a \rightarrow b < \neg a \vee b$
are effectively and/or classically sound. *(8 marks each)*

4) Find out by means of *Beth tableaux* whether the propositions/arguments:
(i) $\neg\neg a \rightarrow a$
(ii) $a \vee b < \neg(\neg a \wedge \neg b)$
are 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? *(2 marks 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 "Some man is not wise";
(ii) the subcontrary, if any, of "Some man is not wise";
(iii) the contradictory, if any, of "Some man is not wise";
(iv) the subaltern, if any, of "Some man is not wise";
(v) the superaltern, if any, of "Some man is not wise".

7) Give the simple and/or accidental converse, if any, of:
(i) No man is wise
(ii) All men are wise *(2 marks each)*

8) Show by means of a *Beth tableau* that SaP is contrary to SoP,

i.e., that $\bigwedge_x [S(x) \rightarrow P(x)] < \neg \bigvee_x [S(x) \wedge \neg P(x)]$ is classically sound. *(8 marks)*

9) Show by means of a *Beth tableau* that, given that S is non-empty, SiP is subcontrary to SoP,

i.e., that $\bigvee_x S(x)$,, $\neg \bigvee_x [S(x) \wedge P(x)] < \bigvee_x [S(x) \wedge \neg P(x)]$ is classically sound. *(8 marks)*

10) Show by means of a *Beth tableau* that the 2nd figure syllogism *Cesare* is classically sound. *(12 marks)*