

**PY1003: Introduction to Logic**  
**Example Class 4**

**Trees for Sentential Logic II; Predicate Logic**

A Determine whether or not the following sequents are valid. Use a tree to justify your reasoning. If a sequent is invalid, explicitly exhibit a counterexample.

- (i)  $A \rightarrow (B \vee C) \vdash (A \rightarrow B) \vee (B \rightarrow C)$
- (ii)  $\vdash (A \rightarrow B) \vee (B \rightarrow C)$
- (iii)  $B \vdash A \rightarrow B$
- (iv)  $B \vdash A \leftrightarrow B$
- (v)  $A \vee (B \wedge C) \vdash (A \vee B) \wedge (A \vee C)$
- (vi)  $A \rightarrow C, B \rightarrow C \vdash (A \rightarrow B) \rightarrow C$

B Formalise the following argument into the language of Sentential Logic. Determine its validity, using a tree to justify your reasoning. If an argument is invalid, explicitly exhibit a counterexample.

We will go for dinner if agreement is reached about where to go. But agreement will be achieved, if at all, only if some of us compromise. So we will not go for dinner unless some of us compromise.

C Formalise the following sentences into the language of Predicate Logic. Provide a key to your formalisation.

- (i) Someone is mortal
- (ii) No fish are mammals
- (iii) Somebody is rich and it is not David
- (iv) Some philosophers are good logicians
- (v) If someone is rich then someone is happy
- (vi) Some intelligent people wear glasses but some of them don't
- (vii) There is at least one tall philosopher who is good at logic