The exam is worth a total of 160 points. The points for each section & question are noted in parentheses.

A. DEFINITIONS AND QUESTIONS. (60 pts.)

1. Demonstrate that "Many people believe that _____" is not a truth-functional sentential operator. (10)

2. An argument is sound if and only if……..(10)

3. A set of statement forms is consistent if and only if…..(10)

4. Define an inductive argument. (10)

5. Complete the following. (10 pts., 2 pts. each)

   a. The major operator of (~((P ∨ Q) • (R • S)) ≡ (P ⊃ ~T)) is _____.

   b. "A provided that B" is best symbolized as _____.

   c. The negation of a contradiction is a _____.

   d. If two statements forms logically imply each other they are _____.

   e. An argument with inconsistent premises is always _____.

6. Determine whether each of the following claims are true or false. (10 pts., 2 pts. each)

   a. An invalid argument must have a false conclusion.

   b. "Neither C nor D" could be symbolized as (~C ∨ ~D).

   c. Any contradiction is logically equivalent to any other contradiction.

   d. (C • D) is a subformula of ((A ∨ B) ⊃ (~C • ~D)).

   e. A contingent statement form logically implies any tautology.

B. SYMBOLIZATION. Use the indicated abbreviations throughout. (20 pts., 4 pts. each)

7. Only if we CONSERVE our natural resources and RECYCLE newspapers will human life on this planet be SAVED.

8. If Janet becomes a DOCTOR or a LAWYER then her MOTHER and FATHER will be thrilled.

9. We will not make it to the SHOW on time, unless you HURRY up with your tie.

10. Chris will be JAILED for income tax evasion just in case he does not PAY his taxes.

11. A wise person will be neither a BORROWER nor a LENDER.

C. TRUTH TABLE PROBLEMS. (80 pts.)

12. Use the full truth table method to determine whether the following argument form is valid or not. Show your work and be explicit in your answer. (16)

$\sim(p \vee q) \quad r \vee (p \equiv q) \quad / \therefore \; p \equiv \sim r$

Valid or invalid?

13. Use the full truth table method to determine whether the following is a tautology, contradiction, or contingent form. Show your work and be explicit in your answer. (16)

$((p \supset q) \bullet \sim(q \vee \sim p))$

Tautology, contradiction, or contingent?

14. Use the full truth table method to determine which of the following are logically equivalent to $(p \bullet q)$. Show your work and be explicit in your answer. (16)

a. $\sim(\sim p \bullet \sim q)$ b. $\sim(p \supset \sim q)$ c. $\sim(\sim p \vee \sim q)$

Which (if any) of a, b, c, is logically equivalent to the given wff?

15. Use the full truth table method to test whether (a) logically implies (b). Show your work and be explicit in your answer. (16)

a. $(\sim p \supset q)$ b. $(p \vee q)$

Logical implication or not?

16. Use the full truth table method to determine if the following set is consistent. Show your work and be explicit in your answer. (16)

a. $q \supset \sim q$ b. $\sim(\sim p \vee q)$ c. $p \equiv q$ d. $\sim p$

Consistent or not?