THE UNIVERSITY OF QUEENSLAND

First Semester Examination, June 2001

# MATH1061

## DISCRETE MATHEMATICS
(Unit Courses, B. Inf. Tech.)

**Time: TWO Hours** for working

Ten minutes for perusal before examination begins

**00520**

**Check that this examination paper has 16 printed pages!**

**CREDIT WILL BE GIVEN ONLY FOR WORK WRITTEN ON THIS EXAMINATION PAPER!**

Candidates may attempt all questions.

The marks for each question are shown; total marks are 107, but 100 marks constitute a full score.

Use the blank pages for rough work, amendments etc.

Pocket calculators allowed.

FAMILY NAME (PRINT):

GIVEN NAMES (PRINT):

SIGNATURE:

STUDENT NUMBER:

| QUESTION | MARK | QUESTION | MARK | QUESTION | MARK |
|---|---|---|---|---|---|
| 1 | | 6 | | 11 | |
| 2 | | 7 | | 12 | |
| 3 | | 8 | | 13 | |
| 4 | | 9 | | 14 | |
| 5 | | 10 | | TOTAL | |

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**1. (6 marks)** Construct truth tables for the following two statement forms. Then state whether or not the given statement form is a tautology. Write your answers in the tables given below.

**(a)** $[\sim(p\wedge\sim q)] \longleftrightarrow [q \vee (\sim p)]$

| $p$ | $q$ | | | |
|---|---|---|---|---|
| $T$ | $T$ | | | |
| $T$ | $F$ | | | |
| $F$ | $T$ | | | |
| $F$ | $F$ | | | |

Is the given statement form a tautology? (Yes or No)

**(b)** $[(a \rightarrow b) \rightarrow c] \longleftrightarrow [((\sim a) \vee b) \wedge c]$

| $a$ | $b$ | $c$ | | |
|---|---|---|---|---|
| $T$ | $T$ | $T$ | | |
| $T$ | $T$ | $F$ | | |
| $T$ | $F$ | $T$ | | |
| $T$ | $F$ | $F$ | | |
| $F$ | $T$ | $T$ | | |
| $F$ | $T$ | $F$ | | |
| $F$ | $F$ | $T$ | | |
| $F$ | $F$ | $F$ | | |

Is the given statement form a tautology? (Yes or No)