DUBLIN CITY UNIVERSITY

Autumn 1999

COURSE:	APPLIED PHYSICS PHYSICS with a LANGUAGE
YEAR:	2
SEMESTER	2
EXAMINATION:	Electronics 2; PS206
EXAMINER:	Dr B. Lawless
DURATION:	2 hours
INSTRUCTIONS:	Answer 4 parts of Question 1 (50 %) and 2 other questions (25 % each)

Do not turn over this page
until instructed to do so.

Question 1. Answer four parts of this question.

(a) Give an account of the principal differences between a Schottky diode and a pn diode.

(b) Construct the truth table for the circuit shown in Figure 1.

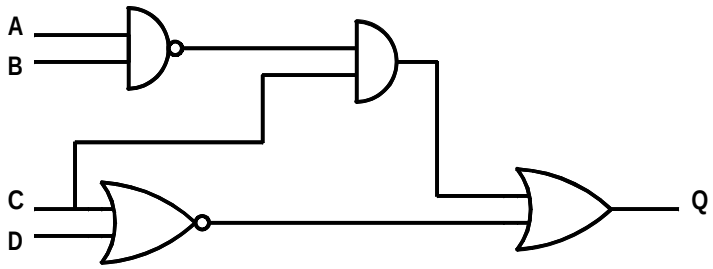

Figure 1: Question 1 (b)

(c) Convert 2989_D to hexadecimal and convert $2A_H$ to Gray code.

(d) Construct the truth table corresponding to the minterm list

$$\Sigma m(1, 3, 5, 8, 12, 14)$$

(e) Draw the logic gate circuit represented by the following expression:

$$Q = A.\overline{B} + B.C$$

(f) Explain what is meant by the term "Canonical Sum of Products form" as applied to a Boolean expression.

(g) Minimize the expression:

$$Q = \overline{A}.\overline{B}.\overline{C}.D + \overline{A}.B.\overline{C}.D + A.B.\overline{C}.D + \overline{A}.B.C.D + A.B.C.D$$

Question 2. Give brief explanations of each of the following terms using circuit diagrams to illustrate your answer, where appropriate:

(a) TTL logic
(b) CMOS
(c) Current sinking
(d) Edge triggering
(e) Propagation time
(f) Modulo n counter
(g) BCD code
(h) Gray code
(i) RS flip flop
(j) Contact debouncing

Question 3. State de Morgan's theorem.
Discuss the statement "All digital logic circuits can be constructed from either NAND gates or NOR gates."
Determine the truth table for the circuit shown in Figure 1.

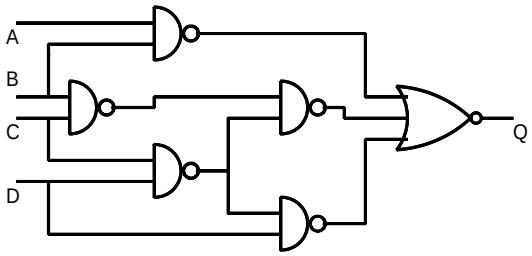

Figure 2: Question 3

Question 4. Give an account of the operation of an R-2R digital to Analog converter.
Give an account of the operation of:

(a) A Successive approximation A/D converter.
(b) An Integrating A/D converter.
(c) A Flash converter.

Question 5. Explain the following terms as they apply to an 8255 interface chip on a computer interface card:

(a) Base address
(b) Port address
(c) Mode control word
(d) Input/Output
(e) Bit set mode