



MERU UNIVERSITY COLLEGE OF SCIENCE & TECHNOLOGY

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University Examinations 2010/2011

SECOND YEAR, SECOND SEMESTER EXAMINATIONS FOR THE DEGREE OF BACHELOR OF INFORMATION TECHNOLOGY

ICS 2205: DIGITAL LOGICS

DATE: DECEMBER 2010

TIME: 2 HOURS

INSTRUCTIONS: Answer Questions *One* and any other *Two* Questions

QUESTION ONE – (30 MARKS)

- (a) Convert the following numbers to Binary
- (i) 1904 (2 Marks)
 - (ii) 8192 (3 Marks)
- (b) What is 1001101001 (binary) in
- (i) Decimal
 - (ii) Octal
 - (iii) Hexadecimal (5 Marks)
- (c) Using two 2-input show
- (i) AND gate
 - (ii) OR gate
 - (iii) NAND gate
 - (iv) NOR gate (4 Marks)
- (d) Draw the truth table for each of the gates above (4 Marks)
- (e) Given that $F = X + Y'Z$
- (i) Draw the truth table
 - (ii) Draw the logic circuit diagram (6 Marks)
- (f) Using Boolean algebra, simplify the following Boolean function
- (i) $F = ABC + ABC' + A'C$ (3 Marks)
 - (ii) Using the minimum number of gates, show a logic diagram of the above question (F(i)). (3 Marks)

QUESTION TWO – (20 MARKS)

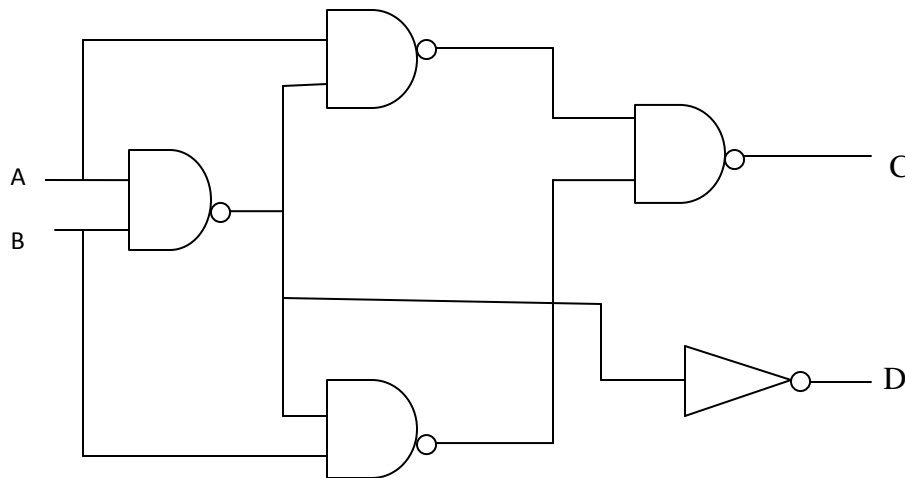
- (a) Draw a karnaugh map for logic to determine if a 3 bit integer (0 to 7) is prime (assume that 0, 1 and 2 are not primes) (5 Marks)
- (b) Show a realization with 2 input gates. (5 Marks)
- (c) Find logic to perform multiplication of two 2-bit unsigned numbers (i.e. each 0 to 3) producing 4 bit results. Use a separate karnaugh map for each output bit. (10 Marks)

QUESTION THREE – (20 MARKS)

- (a) A student lost in Meru stops at a fork (Makutano Junction) from the Nakumati way. He knows that two motorcycle gangs inhabit the area. One of which always tells the truth and one of which always lies. He wants to know which roads lead to Meru University.
 - (i) What question should he ask? (3 Marks)
 - (ii) Draw the truth table to show the right direction. (5 Marks)
 - (iii) Draw a logic circuit diagram that will show the realization. (7 Marks)
- (b) Use the truth table to show that:
 $x = (X \text{ AND } Y) \text{ OR } (X \text{ and NOT } Y)$ (5 Marks)

QUESTION FOUR – 20 MARKS)

(a)



- (i) Draw the truth table (6 Marks)
- (ii) What does this circuit do? (4 Marks)
- (b) Show AND Function can be constructed from two input NAND gates. (6 Marks)
- (c) With 10 bits addressing line, how many memory locations could you address? (4 Marks)