

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

FIRST YEAR FIRST SEMESTER EXAMINATIONS FOR BACHELORS OF APPLIED
COMPUTER SCIENCE

ACSC 102: INTRODUCTION TO DIGITAL LOGIC

STREAMS: BSC. APPLIED COMPUTER SCIENCE Y1S1

TIME: 2 HOURS

DAY/DATE: TUESDAY 15/12/2020

11.30AM – 1.30PM

INSTRUCTIONS

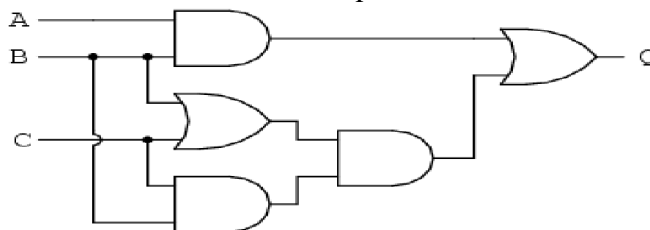
1. Answer **all questions** in section A and any other **two questions** from section B.
2. No Reference Material is allowed in the exam Room.
3. All Mobile phones should be switched off in the exam room.

SECTION A (COMPULSORY)

QUESTION 1(COMPULSORY) [30 MARKS]

- a) Outline FOUR differences between digital and analogue electronics (4marks)
- b) A certain student claimed that a NOT gate cannot take more than one input at a time. Is the statement true? Justify. (3marks)

c) Below is a digital circuit. Use it to answer the questions below: -



- i) Write output Q. (2marks)
- ii) Simplify output Q of the above circuit (show the simplification process) (3marks)

- iii) Draw a resultant circuit after the simplification. (2marks)
- d) Outline FIVE digital output devices of a computer (5marks)
- e) Perform the following decimal arithmetic using binary $136_{10} + 345_{10}$ (4marks)
- f) Draw a truth table of an XNOR with two inputs (2marks)
- g) Differentiate between serial and parallel port, naming a device that can be connected to each port. (5marks)

SECTION B (Answer two question from this section)

QUESTION 2 [20 MARKS]

- a) Use truth table to prove the following Boolean algebra.
- i) $A + \bar{A}B = A + B$ (4 marks)
- ii) $A + AB = A$ (4marks)
- b) There are various adapter cards that can be connected onto a computer. Outline FIVE such cards and their functions. (10marks)
- c) Explain Two characteristics of RAM (2marks)

QUESTION 3 [20 MARKS]

- a) With reference to decoders
- i) Using an example of a digital device, explain the function of a decoder (3marks)
- ii) Draw a circuit diagram of a 2 to 4 decoder (5marks)
- iii) Draw a truth table of the above decoder (4 marks)
- b) Convert binary 1110001_2 into Decimal (3marks)
- c) Use Karnaugh map to minimize the equation below (5marks)

$$Z = f(A,B,C) = \bar{A}B + B\bar{C} + BC + A\bar{B}\bar{C}$$

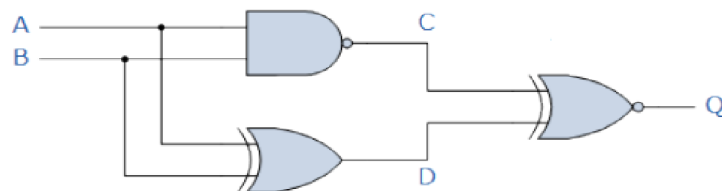
QUESTION 4 [20 MARKS]

- a) Computers have evolved from the 1st generation to the current 5th Generation. Explain the electrical/processing technology that was used in each generation. (10marks)
- b) Explain four basic types of registers found in a computer CPU (4marks)

- c) Explain the following Boolean laws using an example each
- i) Involution (2marks)
 - ii) Commutative (2marks)
 - iii) Complementary (2marks)

QUESTION 5 [20 MARKS]

- a) Explain the importance of Karnaugh map in Digital electronics (2marks)
- b) Below is a circuit. Use it to answer the questions that follow:-



- i) Write the truth table of the circuit above (4marks)
 - ii) From the truth table, can the circuit be minimized? If so draw the minimized circuit. (2marks)
- c) Convert 362.35_8 into a decimal number (4marks)
- d) Draw the symbol and truth table of FOUR basic logic gates (8marks)

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