

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF SCIENCE IN
APPLIED COMPUTER SCIENCE

ACSC 102: INTRODUCTION TO DIGITAL LOGIC

STREAMS: ACSC Y1S1

TIME: 2 HOURS

DAY/DATE: TUESDAY 17/12/2024

11.30 A.M. – 1.30 P.M.

SECTION A (COMPULSORY)

QUESTION 1 (COMPULSORY) [30 MARKS]

- a) Computer interconnects with peripheral devices with ports. Name FIVE computer ports, and what it can connect to. (5marks)
- b) A certain student wanted to pass three inputs to an AND gate, but unfortunately, he had AND gates which allows for two inputs. Explain how he can use two AND gates to perform the task. (3marks)
- c) Convert 567.35_{16} into a decimal number (4marks)
- d) With reference to a flip flop, answer the following question: -
 - i) What is the function of a J-K flip flop (2marks)
 - ii) Draw the truth table of a JK flip flop (4marks)
 - iii) Outline one uses of a flip flop (1mark)
- e) Outline FIVE differences between the 4th and the 2nd generation computers (5marks)
- f) Draw a truth table of an NAND gate with three inputs (2marks)
- g) Draw the circuit of a 2 to 4 decoder. (4marks)

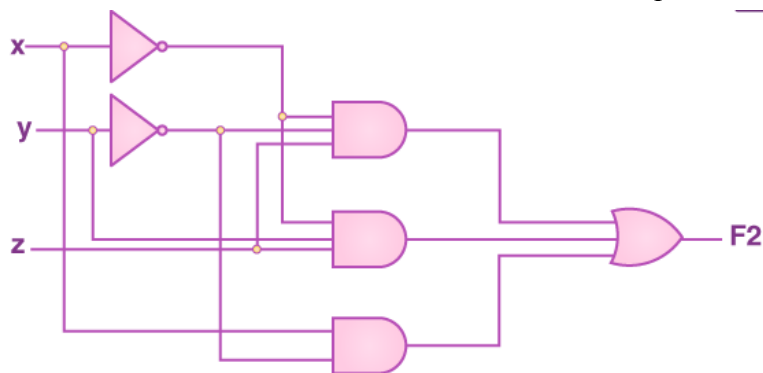
SECTION B (Answer two question from this section)

QUESTION 2 [20 MARKS]

- a) Use truth table to prove the following Boolean algebra.
- i) $(A+B)(A+B') = A$ (4 marks)
 - ii) $ABC + A B + A = A$ (4 marks)
- b) Explain the function of a computer power supply, hence state THREE voltage levels that it can offer (5marks)
- c) Explain FOUR differences between a computer RAM and ROM (4marks)
- d) Explain three uses of decoders in electronic components (3marks)

QUESTION 3 [20 MARKS]

- a) Convert the following number systems.
- i) 1010110.11 binary to decimal (3marks)
 - ii) 4AB45 hexadecimal to Octal (3marks)
 - iii) 12345 decimal to Octal (3marks)
- b) Below is an un-minimized circuit. Use it to answer the questions below.



- a. Write the output F2 (2marks)
- b. Minimize the circuit using Karnaugh map (5marks)
- c. Minimize the circuit using Boolean laws (4marks)

QUESTION 4 [20 MARKS]

- a) The 6th generation computer, is viewed to be a computer of the near future. Explain FIVE anticipated capabilities of the 6th generation computer. (5marks)
- b) Using binary, Perform the following arithmetic leaving your answer as a decimal number $1B6_{16} + 345_8$ (5marks)
- c) Outline FOUR functions of computer input devices (4marks)
- d) Explain the following Boolean laws using an example in each case

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- i) Identity (2marks)
- ii) Double negation (2marks)
- iii) Complementary (2marks)

QUESTION 5 [20 MARKS]

- a) Explain the importance of Karnaugh map in Digital electronics (2marks)
 - b) Draw a truth table of an SR latch (3marks)
 - c) With reference to Encoders, answer the following questions
 - i) Using an example of a digital device, explain the function of an encoder (3marks)
 - ii) Draw a circuit diagram of a 4 to 2 encoder (4 marks)
 - iii) Draw a truth table of the above encoder (4 marks)
 - iv) Outline TWO differences between an encoder and a decoder (4marks)
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