

CHUKA



UNIVERSITY

**UNIVERSITY EXAMINATIONS**

**CHUKA AND THARAKA CAMPUSES**

**EXAMINATION FOR THE AWARD OF CERTIFICATE IN COMPUTER SCIENCE**

**COSC 00108: INTRODUCTION TO DIGITAL LOGIC AND DATA COMMUNICATION**

**STREAMS: CERT COMP SCI. Y1S2**

**TIME: 2 HOURS**

**DAY/DATE: WEDNESDAY 5/12/2018**

**2.30 P.M – 4.30 P.M.**

**INSTRUCTIONS:**

- Answer question **ONE** and **TWO** other questions
- Do not write anything on the question paper
- This is a **closed book exam**, no reference materials are allowed in the examination room
- There will be **NO** use of mobile phones or any other unauthorized materials
- Write your answers legibly and use your time wisely.

**SECTION A**

**Question one (30 marks)**

- a. Draw respective symbols and state the uses of a resistor and diode in an electronic circuit. [4 marks]
- b. Define frequency and period as terminologies of a wave. [4 marks]
- c. Simplify the following expression using Boolean algebra and its identities. Show each step. [4 marks]  

$$F = B(A + \bar{C}) + A + A(\bar{A} + B)$$
- d. What is meant by data transmission impairment, give three types of transmission impairment. [5 marks]
- e. Draw the circuit diagram and truth table for half adder. [4 marks]
- f. Highlight five components used in data communication. [5 marks]
- g. Data can be corrupted during transmission, distinguish between single bit and burst errors. [4 marks]

**SECTION B**

**Question Two (20 marks)**

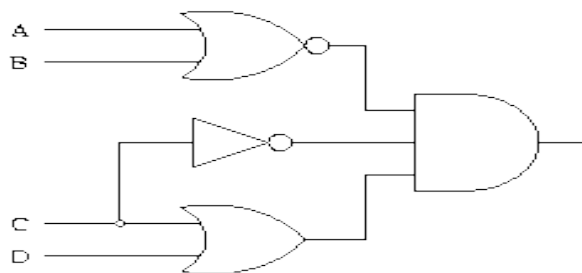
- a. Give the standard logic symbols of the following gates.
  - i. *exclusive -NOR* [2 marks]
  - ii. *exclusive -OR* [2 marks]
  - iii. OR [2 marks]
- b. Draw a circuit diagram of the given boolean expression,  $(X+Y) ( \bar{X}Y )$  [5 marks]
- c. Explain the following concepts in data communication, and give appropriate examples in each case.
  - i. Simplex [3 marks]
  - ii. Half- duplex [3 marks]
  - iii. Full – duplex [3 marks]

**Question three (20 marks)**

- a. Explain the two types of serial transmission. [6 marks]
- b. Draw corresponding logic gates for circuits with two parallel switches and two switches in series. [4 marks]
- c. Draw a circuit diagram and a truth table of a flipflop. [10 marks]

**Question four (20 marks)**

- a. Discuss the following error detection techniques
  - i. Parity checks [4 marks]
  - ii. Longitudinal Redundancy Checking. [4 marks]
  - iii. Polynomial checking. [4 marks]
- b. Write intermediate boolean expressions along the path of the circuit below. [8 marks]



**Question five (20 marks)**

- a. Giving an example distinguish between combinational circuits and sequential circuits [6 marks]
- b. Transmission medium can either be guided or unguided, name four guided transmission medium use in data communication [4 marks]

c. Using truth table show that

[10 marks]

$$XZ = (X+Y)(X+\tilde{Y})(\tilde{X}+Z)$$

---