

**MOSHOOD ABIOLA POLYTECHNIC, ABEOKUTA
DEPARTMENT OF COMPUTER SCIENCE**

2022/2023 1ST SEMESTER EXAMINATIONS

Course Code: COM 112

Time Allowed: 3hrs

Course Title: INTRODUCTION TO DIGITAL ELECTRONICS (3 UNITS)

Class (es) writing the Paper: ND I COMPUTER SCIENCE (F/T & PT)

Instructions- PAPER I (THEORY)-Answer any FOUR questions.

SECTION A

1a. Evaluate the following:-

- (i) $B6E_{16}$ to binary
- (ii) 101.011_2 to decimal
- (iii) 110101.11_2 to octal
- (iv) 973_{10} to BCD
- (v) $A7.C_{hex}$ to decimal
- (vi) $0101:0110:0100_{BCD}$ to decimal
- (vii) 573.4_8 to decimal

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b. State one major importance of Binary Number System.

c. Distinguish between the Digital Signal and Analog Signal. (20 mks)

2a. (i) Prove by using the truth table that the output given by expression

$$F = \overline{A} \overline{B} (\overline{B} + C) \text{ and } F = \overline{ABC} \text{ are the same}$$

(ii) Describe an Integrated Circuit (IC). Hence, write four categories of IC based on Packing Density.

b. Define the following IC terminologies:

- (i) Fan in (ii) Fan out (iii) HIL (iv) HIH (v) Power Dissipation (20 mks)

3a. (i) Draw the truth table and write the Boolean equations for the function:

$$f(A,B,C) = \{0,1,4,5,7\}. \text{ Draw the followings:}$$

(ii) State five Laws of Boolean Algebra.

b. (i) Define a Counter and state its three major uses.

(ii) Write one shortcoming of an Asynchronous Counter (20 mks)

4a. (i) Distinguish between Half and Full Adder.

(ii) Draw the symbol and the truth table of an half adder that performs an addition operations of 2-bit binary numbers. Hence, design a suitable logic circuit/diagram that justifies your answer.

(iii) State one limitation of an half adder

b. (i) Define a Shift Register

(ii) With the aid of diagrams, differentiate between Serial and Parallel Transfer. (20 mks)

*5a. Draw the truth table of the following logic gates:-

(i) 3-inputs AND gate

(ii) 2-inputs OR gate.

b. Describe the following terms:-

(i) Bytes

(ii) Bits

(iii) Nibble

(iv) Word

(v) Code

c. Design a RS Flip-Flop circuit using NOR GATE.

(20 mks)

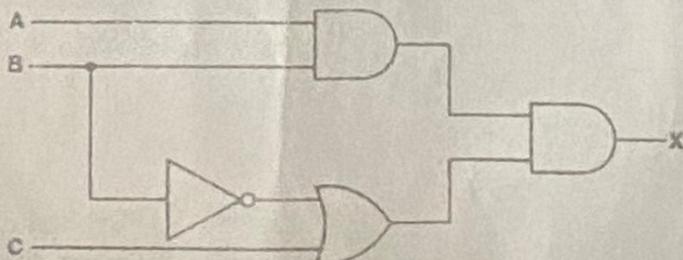
SECTION B – Attempt any ONE question in ALL (Each question carry equal marks.)

1. Simplify the following:

a) $\bar{L}MN + L\bar{M}\bar{N} + LM\bar{N} + \bar{L}\bar{M}\bar{N}$ (5 marks)

b) $XYZ + \bar{X}YZ + X\bar{Y}\bar{Z} + \bar{X}\bar{Y}\bar{Z}$ (5 marks)

c) Write a logic statement that corresponds with the below logic circuit (10 marks)



2a Design a logic that will arrive a boiler Bolenioid (Z) to operation and the circulatory pump (P) is turned off or if Pilot Light (L) goes off. (10 marks)

2b Draw the combinational logic diagram of the following equation

i. $(A + B + C)(\bar{A} + B + \bar{C})(A + B + \bar{C})$ (5 marks)

ii. $\bar{A}B\bar{C} + \bar{A}BC + ABC$ (5 marks)