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(University of Choice)

MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY (MMUST)

MAIN CAMPUS

UNIVERSITY EXAMINATIONS
2022/2023 ACADEMIC YEAR

THIRD YEAR SECOND SEMESTER EXAMINATIONS

FOR THE DIPLOMA
IN
ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE CODE: **DEE 077**

COURSE TITLE: **DIGITAL ELECTRONICS**

DATE: Wednesday 19th April, 2023 **TIME:** 9.00 a.m – 11.00 a.m

INSTRUCTIONS TO CANDIDATES

ANSWER QUESTION ONE AND ANY OTHER TWO QUESTIONS.
QUESTION ONE CARRIES 30 MARKS AND ALL OTHERS 20 MARKS EACH.

TIME: 2 Hours

MMUST observes ZERO tolerance to examination cheating

QUESTION ONE (30mks)

a) State two advantages and two disadvantages of digital representation (4mks)

b) Convert the following Decimal into the equivalent binary (6mks)

i) 85_{10}

ii) 29_{10}

iii) 40_{10}

c) Convert the following into Binary Coded Decimal (BCD) (4mks)

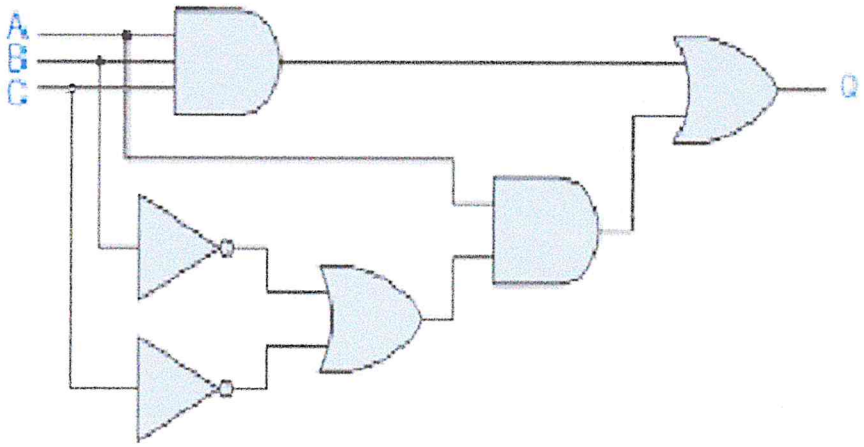
i) 8579_{10}

ii) 100_{10}

d) Name four applications of flip flops (4mks)

e) A seven-bit hamming code received at the receiver is 1100100. Is there an error in the received code? If yes what is the correct code? (4mks)

f) Derive the output of the logic circuit below in terms of the inputs (6mks)



QUESTION TWO (20mks)

a) Simplify using K-map the Boolean expression below (6mks)

$$F = ABC + \bar{A}\,\bar{B}\,\bar{C} + \bar{A}\,\bar{C}\,D$$

b) Draw the logic circuit for the simplified expression in (a) above (4mks)

c) With the aid of truth table and symbols explain the two special gates (6mks)

d) Draw the logic circuit that performs the following function ;

An alarm comes on when door is closed and the level of liquid in tank X is equal to that in tank Y (4mks)

QUESTION THREE (20mks)

a) Outline 3 application areas of number system (6mks)

b) Using K map simplify the following Boolean expression and implement it using logic circuits

$$F(W, X, Y, Z) = \sum (3,5,7, 8, 9) + \sum\Phi (0, 1, 2, 10, 11, 14,15)$$ (14mks)

QUESTION FOUR (20mks)

a) Differentiate between the combinational logic circuits and sequential logic circuits. (2mks)

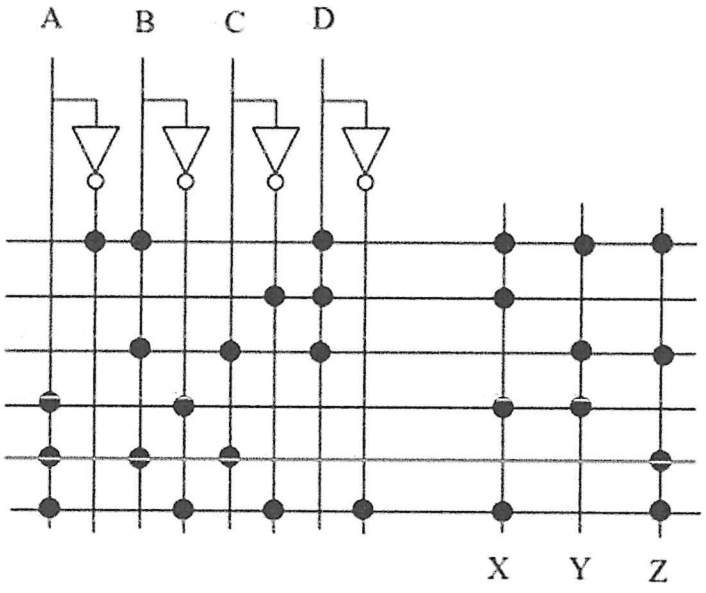
b) Convert $F3_{16}$ to Octal number system. (2mks)

c) State three application of the Boolean Algebra (3mks)

d) A company has 4 directors ABC and D, the percentage shares hold by them are 35,30,25,10 respectively. Their voting power is proportional to shares held by them. Any major decision must have a support of 60% of share as stock. Design combinational logic circuit for voting in the company (13mks)

QUESTION FIVE (20mks)

The internal connection diagram for a PLA is given below.



(a) Write the equations realized by the PLA. (6mks)

(b) Specify the truth table for a ROM which would realize the same function (14mks)