FEDERAL UNIVERSITY OF TECHNOLOGY
SCHOOL OF SCIENCE AND TECHNOLOGY EDUCATION
DEPARTMENT OF INDUSTRIAL AND TECHNOLOGY EDUCATION
SECOND SEMESTER EXAMINATION 2021/2022 SESSION

COURSE TITLE: DIGITAL ELECTRONICS
COURSE CODE: ITE 562
TIME ALLOWED: 2HOURS
INSTRUCTION: ANSWER ANY FOUR QUESTIONS.

1. (a) Define Minterms and Maxterms, giving an example of each

(b) Develop a truth table for each of the following expressions

$$X = \bar{A}\bar{B}C + A\bar{B}\bar{C} + ABC$$
$$X = \bar{A}BC + A\bar{B}\bar{C}$$

2. (a) Convert the following numbers: (i) 52643_8 to Decimal (ii) 25884_{10} to Hexadecimal (iii) 4386 to BDC

(b) Differentiate between TTL, ECL and CMOS logic circuits under the following:

(i) Design rule (ii) Power consumption (iii) Speed

3 (a) State the main stages to creating a logic expression using karnaugh map

(b) Use Karnaugh map to simplify the following Boolean equations

$$X = \hat{A}\hat{B}\hat{C}\hat{D} + \bar{A}B\bar{C}D + \hat{A}BCD + \bar{A}BC\bar{D} + AB C\bar{D} + A\bar{B}C\bar{D} + A\bar{B}\bar{C}\bar{D} + AB\bar{C}D +$$
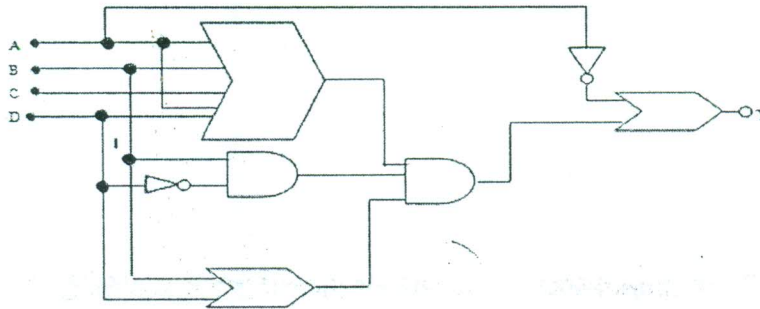
$$A\bar{B}CD + ABCD$$

4 (a). Prove the following Boolean expressions by means of truth table
(i) $A + \bar{A}B = A + B$ (ii) $A + AB = A$ (iii) $(A+B)(A+C) = A + BC$
   (b). simplify the following expressions
(i) $AB + A(B+C) + B(B+C)$ (ii) $AB + AC + ABC$.

5(a). The figure below shows a combinational logic circuit. Redraw the logic circuit and deduce the Boolean equation that represents the output Y.

(b) Use Boolean theorems to simplify the result obtained for the output Y.