



EDO UNIVERSITY, IYAMHO, EDO STATE  
FACULTY OF SCIENCE  
DEPARTMENT OF COMPUTER SCIENCE  
Second Semester Examination, 2016/17 Session

**Course Title:** Digital Design      **Course Code:** CMP 122

**Time allowed:** 2hrs **Instruction:** Answer Five (5) Questions Only    **Date:** 08/09/2017

Q1. A couple have Two Children Jane and Joe. When eating out they will go to a restaurant that serves only Hamburgers, or one that serves only Chicken. Before going out the family votes to decide on the restaurant. The majority wins except when Mum and Dad agree, and in that case they win. Any other tie votes produce a trip to the Chicken restaurant. Design a Logic Circuit that will automatically select the restaurant when everyone votes. **14mks**

Q2. Derive the Logical Equation for a circuit that will add the 2- bit binary numbers  $(A_1A_0)_2$  and  $(B_1B_2)_2$ , and produce the Sum Bits  $(S_1S_2)_2$  and the Carry out bit  $C_1$ . **14mks**

Q3. a. Design a Logic circuit to implement a building smoke alarm system. **9mks**

b. Explain with appropriate Logic Gate conformity, The Positive Logic Convention Used for All Gate Inputs and Outputs. **5mks**

Q4. Show how the integer -17 would be stored in a computer memory capable of holding

a. 32- bits **6mks**

b. 64- bits **8mks**

Q5. Given the two binary numbers  $X = 1010100$  and  $Y = 1000011$ , USING TWO'S COMPLEMENT perform the subtraction

a.  $X - Y$  **7mks**

b.  $Y - X$  **7mks**

Q6. a. Develop an ASCII Code from Decimal numbers between 0 and 26, and from characters between @ and Z **9mks**

b. Describe fully the operations of the ERROR CODE in relation to the ODD Parity bit and the EVEN Parity bit during information transmission **5mks**

Q7. a. Using DeMorgans Theorem Prove that  $\overline{a + b} = \overline{a} \cdot \overline{b}$ ;  $\overline{a \cdot b} = \overline{a} + \overline{b}$  **7mks**

b. Complement the expression  $a(b + z (x + a))$  **7mks**