



**ELIZADE UNIVERSITY**

**ILARA-MOKIN**

**FACULTY: BASIC AND APPLIED SCIENCES**

**DEPARTMENT: MATHEMATICS AND COMPUTER SCIENCE**

**1<sup>st</sup> SEMESTER EXAMINATION (Stream 2)**

**2017 / 2018 ACADEMIC SESSION**

**COURSE CODE: CSC 205**

**COURSE TITLE: Discrete Structure**

**COURSE LEADER: Dr. E. Ayetiran**

**DURATION: 2 Hours**

**HOD's SIGNATURE**

**INSTRUCTION:**

Candidates should answer any THREE Questions.

Students are warned that possession of any unauthorized materials in an examination is a serious offence.

1. (a) If  $A = \{1,3,4,5,8,11\}$  and  $B = \{2,4,5,6,7,8,10\}$ . Find: (i)  $A \cap B$  (ii)  $A \cup B$  (iii)  $P(A)$  (iv)  $A \Delta B$ 
  - (b) Prove formally that  $(S \cup T)^c = S^c \cap T^c$
  - (c) If  $n = 26 \pmod{7}$ , evaluate the following:  $\sum_{i=1}^n (-2)^i$
  
2. (a) Use truth table to determine if  $(\neg p \wedge (\neg q))$  is equivalent to  $\neg(p \vee q)$ 
  - (b) (i) Convert  $100111_2$  to hexadecimal
  - (ii) Convert 433 to binary
  - (iii) Convert  $1024_8$  to decimal
  - (iv) Find the two's complement of  $100110111_2$
  - (a) What are logic gates. State their applications in Computer Science.
  - (b) Describe with illustrations, the basic logic gates.
  - (c) Formulate the logic gates for the following boolean expressions:
    - (i)  $A + \bar{A}.B$  (ii)  $(A + \bar{B})(CD)$  (iii)  $AB + C$  (iv)  $A(\bar{A}B)$
  
3. (a) Explain the following graph data structures:
  - (i) Adjacency matrix (ii) Adjacency list (iii) Edge list
  - (b) Explain two methods of tree traversal
  - (c) Discuss 4 computing applications of graph theory
  
4. (a) Define the degree of a graph
  - (b) A graph G has the following degrees:  $\text{deg}(a) = 1$ ,  $\text{deg}(b) = 2$ ,  $\text{deg}(c) = 4$ ,  $\text{deg}(d) = 1$ ,  $\text{deg}(e) = 2$ ,  $\text{deg}(f) = 4$  and  $\text{deg}(g) = 0$ .
    - (i) Draw a representation of the graph in (b) above
    - (ii) Using the handshaking theorem, compute the number of edges in the graph
  - (c) Briefly explain graph isomorphism.