LAGOS STATE UNIVERSITY OF SCIENCE AND TECHNOLOGY, IKORODU
COLLEGE OF BASIC SCIENCES
DEPARTMENT OF COMPUTER SCIENCES
FIRST SEMESTER EXAMINATION 2024/2025 ACADEMIC SESSION

Programme: B.Sc. Computer Science
Course Title: Discrete Structure **Course Code: CSC 203**
Course Unit: 3 **Class Level: 200**
No of Students: 200 **Time Allowed: 3 Hours**
Instruction: Attempt Any Four (4) From Six (6) Questions

Question One

Define Logic and Statements **(2 marks)**

a. Indicate the Statements that are valid and invalid below

- **i.** 5 is larger than 7 **(1 mark)**
- **ii.** Would you like some ice cream? **(1 mark)**
- **iii.** Of the 20 balls, 5 are black **(1 mark)**
- **iv.** 12 is a perfect square **(1 mark)**
- **v.** The product of two numbers **(1 mark)**

b. Complete this table: **(8 marks)**

W	M	I ∨ W	′ ∧ M	¬W ∧ M) ∨ ¬M	(W ∧ M) ↔ (M ∨ W)
F	T				
T	F				
T	T				
F	F				

Question Two

Using these details, answer the questions that follow:

U = {Set of even numbers}; A = {2, 4, 6, 8}; B = {2, 10, 6, 14, 18}; C = {20, 22, 2, 10}

a. A ∪ B ∪ C **(1 mark)** **b.** A ∩ C ∩ B **(1 mark)** **c.** A ∪ B| **(1 mark)** **d.** (A ∪ C) ∩ *B* **(1 mark)**
e. (A ∩ *(B ∪ C))* = *(A ∩ B)* ∪ *(A ∩ C)* **(2 marks)** **f.** Proof (B ∪ (A ∪ C)) = ((B ∪ A) ∪ C) **(2 marks)**
g. Write out all the subsets of A **(3 marks)** **h.** Draw a Venn diagram with the details given **(4 marks)**

Question Three

a. i. What is a partially ordered set? How does a lattice differ from a poset? **(5 marks)**
ii. Define a Boolean algebra? **(3 marks)**
b. i. Proof that the set of integers is a poset where a ≤ b has the usual meaning for two integers a and b in Z. **(4 marks)**
ii. Draw the diagram for the set of positive integers that are divisors of 24. **(3 marks)**

Question Four

a i. Using inclusion-exclusion principle, how many positive integers ≤ 100 are multiples of either 2 or 5? **(3 marks)**
ii. Using product rules, On an 8 × 8 chess board, how many ways can I place a pawn and a rook? **(3 marks)**

b i. Solve using matrices,
$x + y - 2z = 3$
$3x - y + z = 5$
$3x + 3y - 6z = 9$ **(3 marks)**

ii. If $A = \begin{pmatrix} 1 & 2 \\ 1 & 3 \end{pmatrix}$ Find |A|. **(3 marks)**

iii. If $A = \begin{pmatrix} 3 & 1 & 2 \\ 1 & 0 & 1 \end{pmatrix}$ and $B = \begin{pmatrix} 1 & 1 \\ 2 & 1 \\ 3 & 1 \end{pmatrix}$ Find AB **(3 marks)**

Question Five

a. Using Pascal's triangle's expand $(1+2/x)^3$ **(8 marks)**
b. In a group of 800 people, how many people are likely to share the same birthday? **(7 marks)**

Question Six

a. Let X be a discrete random variable with PGF
$Gx(z) = Z/5(2+3Z^2)$
Obtain the distribution of x **(10 marks)**
b. How any poker hands (i.e. sets of 5 cards) can be dealt from a standard deck of 52 cards? **(5 marks)**