



ELIZADE UNIVERSITY, ILARA MOKIN  
FACULTY OF BASIC AND APPLIED SCIENCE  
DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE

FIRST SEMESTER EXAMINATION 2020/2021 SESSION

HOD's SIGNATURE

COURSE TITLE: DISCRETE STRUCTURES  
COURSE CODE: CSC 205

INSTRUCTIONS: Answer Any Four Questions

Time Allowed: 2 ½ Hours

- (a) (i) What is discrete structures?  
(ii) Mention any 5 areas in which Discrete Structures is relevant in Computer Science

(b) Prove that  $A \cup (B - A) = A \cup B$

(c) Illustrate the relationship that exist amongst binary, octal and hexadecimal number systems which makes possible direct conversion from one to another.
- (a) Prove that  $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$

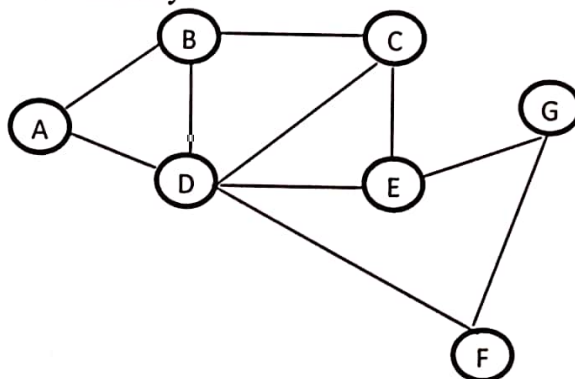
(b) In a group of 60 people, 27 like coffee and 42 like tea and each person likes at least one of the two. How many like both coffee and tea?

(c) Prove that  $\overline{A \cap B} = \bar{A} \cup \bar{B}$
- (a) What is Discrete Structures and how is the course different from Discrete Mathematics?

(b) In a competition, a school awarded medals in different categories. 36 medals in dance, 12 medals in dramatics and 18 medals in in music. If the medals went to a total of 45 persons and only 4 persons got medals in all the three categories, how many received medals in exactly two of these categories?

(c) State and explain any 5 application areas of graphs
- (a) (i) What is a Graph?  
(ii) State 3 advantages of any of the graph representation methods you have mentioned in (i) above.

(b) Given the graph below, explain how each method is used in representing the graph in the computer's memory.



5. (a) Explain the Principle of Mathematical Induction  
(b) Using the principle of mathematical induction, prove that the number of subsets of a finite set with  $n$ -elements is  $2^n$   
(c) Prove by mathematical induction that the sum of the first  $n$  natural numbers is given by the formula:  $1 + 2 + 3 + \dots + n = \frac{n(n+1)}{2}$ .
6. (a) Given the set  $A = \{a_1, a_2, a_3, a_4, a_5, a_6\}$ . What is the cardinality of the power set of A?  
(b) Using appropriate examples, illustrate what you understand by the Pigeonhole Principle  
(c) A bag contains 10 red marbles, 10 white marbles, and 10 blue marbles. What is the minimum number of marbles you have to choose randomly from the bag to ensure that we get 4 marbles of the same colour?