INFORMATION
TECHNOLOGY
UNIVERSITY

Assignment # 03

Course Name	Discrete Structures (SE103T)
Course Instructor	Mr. Abdul Basit
Semester	Spring 2024
Teaching Assistant	Harmain Asghar

Student Name	
Student Roll No	

CLOs	Descriptions
1	Analyze mathematical arguments using propositional logic and rules of inference.
2	Apply set operations build sequences and compute summations.
3	Solve various computing problem using combinatorics, graphs and trees.

Marks Distribution						
Q1/15 CLO-2	Q2/14 CLO-2	Q3/10 CLO-2	Q4/22 CLO-2	Q5/14 CLO-2	Q6/25 CLO-2	Total/100

Instructions:

1. This assignment will access your CLO-2 as per OBE.
2. Assignment will be accepted in both form hand written and soft form (both are mandatory).
3. All questions are required to be solved to get full marks.
4. You need to print the first page of the assignment and attach it on the front of your submission.
5. Solution of questions should be neat and precise otherwise will be marked direct zero.
6. In case of plagiarism, both parties will get zero marks in two assignments.
7. Consult the textbook for reference and help. Do not copy any content from the book without referring to it.

Question: 01 [8+7]

1. List the members of these sets.

    a. $\{x \mid x$ is a real number such that $x2 = 1\}$

    b. $\{x \mid x$ is a positive integer less than 12$\}$

    c. $\{x \mid x$ is the square of an integer and $x < 100\}$

    d. $\{x \mid x$ is an integer such that $x^2 = 2\}$

2. Use a Venn diagram to illustrate the subset of odd integers in the set of all positive integers not exceeding 10.

Question: 02 [6+8]

1. If A={10,11,12,13}and B = {13,14,15} then AUB={10,11,12,13,14,15},draw Venna Diagram.

2. What is The Cartesian product of A and B,If we take two sets A={a,b} and B={1,2}.

Question: 03 [10]

Suppose that A is the set of sophomores at your school and B is the set of students in discrete mathematics at your school. Express each of these sets in terms of A and B.

a) the set of sophomores taking discrete mathematics in your school.
b) the set of sophomores at your school who are not taking discrete mathematics.
c) the set of students at your school who either are sophomores or are taking discrete mathematics.
d) the set of students at your school who either are not sophomores or are not taking discrete mathematics.

Question: 04 [8+7+7]

1. Draw the Venn diagrams for each of these combinations of the sets A, B, and C.

a) A ∩ (B ∪ C)

b) A ∩ B ∩ C

c) (A − B) ∪ (A − C) ∪ (B − C)

2. Suppose that the universal set is U = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}. Express each of these sets with bit strings where the ith bit in the string is 1 if i is in the set and 0 otherwise. a) {3, 4, 5}

b) {1, 3, 6, 10}

c) {2, 3, 4, 7, 8, 9}

3. What subsets of a finite universal set do these bit strings represent?

a) the string with all zeros.

b) the string with all ones.

Question: 05 [2+2+2+2+2+2+2]

Determine whether these statements are true or false.
a) Ø ∈ {Ø}
b) Ø ∈ {Ø,{Ø}}
c) {Ø} ∈ {Ø}
d) {Ø} ∈ {{Ø}}
e) {Ø} ⊂ {Ø,{Ø}}
f) {{Ø}} ⊂ {Ø,{Ø}}
g) {{Ø}} ⊂ {{Ø},{Ø}}

Question: 06 [8+8+9]

1. Determine whether f is a function from Z to R if
   a) f (n) = ±n.
   b) f (n) = √ n2 + 1.
   c) f (n) = 1/(n2 − 4).

2. Determine whether each of these functions from {a, b, c, d} to itself is one-to-one.
   a) f (a) = b, f (b) = a, f (c) = c, f (d) = d.
   b) f (a) = b, f (b) = b, f (c) = d, f (d) = c.
   c) f (a) = d, f (b) = b, f (c) = c, f (d) = d.

3. Find f ∘ g and g ∘ f , where f (x) = x2 + 1 and g(x) = x + 2, are functions from R to R.