INFORMATION TECHNOLOGY UNIVERSITY

Department of Computer and Software Engineering Acitivity-1
(Spring 2024)

Course Name	**Discrete Structures**	**Course Code**	**SE103T**
Time Allowed	**30 mins**	**Total Marks**	**10**
Student Name		**Student Roll No**	

CLOs:

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.

Instructions:

1. This Activity will assess your CLO-2 and CLO-3 as per OBE.
2. Use of pencils is not allowed to answer the questions.
3. Total time is the maximum time allowed to solve the activity.
4. It is a closed book and closed notes activity.
5. All questions are required to be solved with detailed explanation and reasoning to get full marks.
6. Anybody found cheating or helping any other in cheating will get their activity cancelled.

Q1: What is the term a8 of the sequence $\{a_n\}$ if an equals
a) 2^{n-1}? b) 7? c) $1 + (-1)^n$? d) $-(-2)^n$?

Q2: An office building contains 27 floors and has 37 offices on each floor. How many offices are in the building?

Q3: A particular brand of shirt comes in 12 colors, has a male version and a female version, and comes in three sizes for each sex. How many different types of this shirt are made?

Q4: How many bit strings are there of length eight?

Q5: How many strings are there of four lowercase letters that have the letter x in them?

Q6: How many 5-element DNA sequences
a) end with A?
b) start with T and end with G?
c) contain only A and T?
d) do not contain C?

Q7: How many strings of four decimal digits
a) do not contain the same digit twice?

b) end with an even digit?
c) have exactly three digits that are 9s?

Q8: How many license plates can be made using either three digits followed by three uppercase English letters or three uppercase English letters followed by three digits?

Q9: How many license plates can be made using either three uppercase English letters followed by three digits or four uppercase English letters followed by two digits

Q10: Every student in a
discrete mathematics class is either a computer science or a mathematics major or is a joint major in these two subjects. How many students are in the class if there are 38 computer science majors (including joint majors), 23 mathematics majors (including joint majors), and 7 joint majors?

Q11: Suppose that a store sells six varieties of soft drinks: cola, ginger ale, orange, root beer, lemonade, and cream soda. Use a tree diagram to determine the number of different types of bottles the store must stock to have all varieties available in all size bottles if all varieties are available in 12-ounce bottles, all but lemon ade are available in 20-ounce bottles, only cola and ginger ale are available in 32-ounce bottles, and all but lemonade and cream soda are available in 64-ounce bottles? b) Answer the question in part (a) using counting rules.

Q12: How many different permutations are there of the set {a, b, c, d, e, f, g}?

Q13: In how many ways can a set of two positive integers less than 100 be chosen?

Q14: Let S = {1, 2, 3, 4, 5}. a) List all the 3-permutations of S. b) List all the 3-combinations of S.

Q15: Find the value of each of these quantities. a) C(5, 1) b) C(5, 3) c) C(8, 4) d) C(8, 8) e) C(8, 0) f) C(12, 6)

Q16: What is the probability that a fair die comes up six when it is rolled?

Q17: Find the sum of the degrees of the vertices of this graph and verify that it equals twice the number of edges in the graph