Quiz #3 Maximum Marks: 20, Maximum Time: 20 mins
Date : 11/11/2024
MTH210: Discrete Structures **Name:** _____
Semester: Monsoon 2024 **Tutorial Section:** _____

Problem 1. [6] Use generating functions to find the number of non-negative integer solutions of

$$x_1 + x_2 + x_3 + x_4 = 11,\ x_1 \geq 0,\ x_2 \geq 2,\ 2 \leq x_3 \leq x_4,\ x_4 \geq 3.$$

Show your work.

Problem 2. [4] Four friends, Anna, Bob, Carol, and Dave, decide to exchange holiday gifts. Each person buys a gift for one of the others, but by accident, none of them receives the gift intended for them. How many ways can this happen? Show your work.

Problem 3. [6] A school has 5 math teachers, 4 science teachers, and 3 language teachers. For an upcoming event, the school wants to form a committee of 3 teachers, but it must include at least one math teacher. How many ways can the committee be formed? Explain your answer.

Problem 4. [4] Consider the following two graphs G and H:

- **Graph** G has vertices $\{A, B, C, D, E\}$ and edges $\{AB, AC, AD, BC, BD, CD, DE\}$.
- **Graph** H has vertices $\{1, 2, 3, 4, 5\}$ and edges $\{12, 13, 14, 15, 23, 24, 34\}$.

Prove that the graphs G and H are **isomorphic**.