SCHOOL OF APPLIED SCIENCE & HUMANITIES
DEPARTMENT OF MATHEMATICS

Subject: Foundations of Engineering Mathematics   Subject Code: 25MT101
Sem.   : Pre-Semester   Academic Year: 2025-2026
Section: 20   Regulation: R25

Assignment 1   **20 Marks**

1. Consider the following data for 120 mathematics students:

   65 study French, 45 study German, 42 study Russian, 20 study French and German,
   25 study French and Russian, 15 study German and Russian, 8 study all three
   languages.

   Let F, G, and R denote the sets of students studying French, German, and Russian,
   respectively.

   (a) Find the number of students studying at least one of the three languages, i.e.
   find n(F∪G∪R).

   (b) Fill in the correct number of students in each of the eight regions of the
   corresponding Venn diagram.

   (c) Find the number k of students studying: (1) exactly one language, (2) exactly two
   languages.

2. If A and B are finite sets, then prove that $n(A \cup B) = n(A) + n(B) - n(A \cap B)$.

3. Answer the following questions with explanations.
   a. If a set A has n elements, then what is the cardinality of the power set of A?
   b. If the sets A and B have 6 and 9 elements respectively, such that A is proper
      subset of B, then what is the total number of elements in $A \cap B$?
   c. Is the power set of an empty set is an empty set?
   d. Does all equivalent sets are equal sets?

4. Illustrate DeMorgan's laws using Venn diagrams.