VIGNAN'S FOUNDATION FOR SCIENCE, TECHNOLOGY & RESEARCH
(Deemed to be University) - Estd. u/s 3 of UGC Act 1956

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 2 — **20 Marks**

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1. Let f: $\mathbb{R} \to \mathbb{R}$ be given by f(x) = $x^2 + 1$ and g: $\mathbb{R} \to \mathbb{R}$ by g(x) = $\sqrt{x-1}$ where the square root means the principal non-negative value.
   a. Find (g∘f)(x) and (f∘g)(x).
   b. Which of these compositions are well-defined for all real numbers? Explain domain restrictions carefully.

2. Let f: $\mathbb{R} - \{2\} \to \mathbb{R} - \{3\}$ be given by f(x) = $\frac{2x+1}{x-2}$. Find $f^{-1}(x)$ and verify that $f(f^{-1}(x)) = x$.

3. Let f: $\mathbb{R} \to \mathbb{R}$ be defined by f(x) = $x^2 - 4x + 3$. Determine whether f is one-one, onto, or bijective. Justify your answer.

4. Let A = {1, 2, 3}. How many onto functions can be defined from A to {a, b}?

5. Let f: $\mathbb{R} \to \mathbb{R}$ satisfy: $f(x + y) = f(x) + f(y) + 2xy$ for all x, y in $\mathbb{R}$, and f(0) = 3. Find f(x).