Assignment for Academic Year 2024-2025 (Beginning January 2025)

CLASS: BA-2nd Year **Course Name: Real Analysis**

Course Code: MATH201TH

ASSIGNMENT-1

Attempt any **TWO** of the following questions:

Ques 1. Find real values of x, which satisfied the inequality $\frac{x-2}{x+2} > \frac{2x-3}{4x-1}$.

Ques 2. Derive the condition under which $|a-b| = |a| - |b|; a, b \in R$.

Ques 3. Show that 0 is the only limit points of the set $\left\{\frac{1}{n} : n \in N\right\}$.

Ques 4. Prove that $\log_{n\to\infty} \sqrt[n]{n} = 1$.

ASSIGNMENT-2

Attempt any **TWO** of the following questions:

Ques 1. Prove that $\log_{n\to\infty} \frac{1}{n}(1 + \frac{1}{2} + \frac{1}{3} + \cdots + \frac{1}{n}) = 0$.

Ques 2. Prove that the sequence $\{a^n\}, a > 1$ is unbounded.

Ques 3. Show that $\sum_{n=1}^{\infty} \frac{1}{n(n+1)} = 1$.

Ques 4. Show that the series $1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \cdots$ is convergent.

ASSIGNMENT-3

Attempt any **TWO** of the following questions:

Ques 1. Discuss the convergence of the series $\sum_{n=1}^{\infty} \frac{1}{x^n + x^{-n}}, x > 0$.

Ques 2. Show that the sequence $f_n(x) = \frac{x}{1+nx^2}, x \in R$ converges uniformly on any closed interval.

Ques 3. Show that the series $\sum_{n=1}^{\infty} \frac{1}{n^2+x^2}$ is uniformly convergence on $[0, \infty)$.

Ques 4. Find the interval of con vergence of the power series $\sum_{n=2}^{\infty} \left(\frac{1}{\log n}\right) x^n$.