The Open University of Sri Lanka

B.Sc/B.Ed. Degree Programme – Level 04

NO BOOK TEST– 2023/2024

Pure Mathematics

PEU4300 – Real Analysis 1

Duration: - One Hour.

Date: - 25.08.2023 **Time: - From 10.30a.m. to 11.30a.m.**

Answer All Questions

1) (a) Show that $x_n = \frac{1}{\sqrt{n}}$ and $y_n = \frac{1}{n}$ for each $n \in \mathbb{N}$ are Cauchy.

Is $\left\langle \frac{x_n}{y_n} \right\rangle$ Cauchy? Justify your answer.

(b) Determine whether each of the following series is convergent or divergent.

For convergent series find the sum of the series.

(i) $\sum_{n=1}^{\infty} 7\left(\frac{2}{5}\right)^{3n-5}$ (ii) $\sum_{i=1}^{\infty} \frac{6^n}{3^n+5^n}$ (iii) $\sum_{i=1}^{\infty} \frac{1}{n(n+2)}$

(02) Discuss the convergence or divergence of the following series.

(i) $\sum_{i=1}^{\infty} \frac{(-1)^{n+1} n}{(2n+1)}$

(ii) $\sum_{n=1}^{\infty} \frac{1}{2n-1}$

(iii) $\sum_{n=1}^{\infty} \left(1+\frac{1}{n}\right)^n$

(iv) $\sum_{n=1}^{\infty} \frac{(n!)^2}{(2n)!}$

(v) $\sum_{i=1}^{\infty} \left(\frac{n}{n+1}\right)^{n^2} 3^n$