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The Open University of Sri Lanka

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

No Book Test – 2024/2025

Pure Mathematics

PEU4300 – Real Analysis 1

Duration: - One Hour.

Date: - 12.10.2024 **Time: - From 10.30 a.m. to11.30a.m.**

Answer All Questions

01) (i) State the definition of Cauchy sequence.

Prove that $\left\langle \frac{5n-2}{3n+4} \right\rangle$ is a Cauchy sequence.

(ii) Let $S_n = \sum_{r=1}^{n}(-1)^{r+1}$. Find S_{99}.

(iii) Discuss the convergence of the series $\sum_{n=1}^{\infty}(-1)^{n+1}$.

(iv) Show that the series $\sum_{r=1}^{\infty}\frac{1}{16}\left(\frac{3}{4}\right)^{5r-8}$ is convergent and find its sum.

(02) Determine the convergence or divergence of each of the following series.

(i) $\sum_{n=1}^{\infty}\frac{\sqrt{n+1}-\sqrt{n}}{n}$ (ii) $\sum_{n=1}^{\infty}\frac{n^n}{3^{5n}}$

(iii) $\sum_{n=1}^{\infty}\left(\frac{25-7n}{3n^2+4}\right)$ (iv) $\sum_{n=1}^{\infty}\frac{3^n\, n!}{n^n}$.