The Open University of Sri Lanka

B.Sc/B.Ed. Degree Programme

Open Book Test (OBT) – 2021/2022

Pure Mathematics– Level 04

PEU4301 – Real Analysis II

Duration: - One Hour.

Date: - 31.12.2022 **Time: - 04.00 p.m. – 05.00 p.m.**

Answer All Questions

Q1) Find the following limits by using Sandwich theorem:

(i) $\lim_{x\to 0} x^2 e^{\sin\left(\frac{1}{x}\right)}$ and

(ii) $\lim_{x\to 0} h(x)$, where $h(x) = \begin{cases} 0, \text{if } x \in \mathbb{Q}^c \\ x^2, \text{if } x \in \mathbb{Q} \end{cases}$

[40 Marks]

Q2) Define two functions f and g from $\mathbb{R}$ into $\mathbb{R}$ such that $\lim_{x\to 0} f(x)$, and $\lim_{x\to 0} g(x)$ do not exist, but $\lim_{x\to 0}[f(x) + g(x)]$ exists.

[30 Marks]

Q3) Let $h: \mathbb{R} \to \mathbb{R}$ be defined by $h(x) = 3x^2 + 2$. By using the $\varepsilon - \delta$ definition, show that h is continuous at point $x = 2$.

[30 Marks]

..... End .....