

The Open University of Sri Lanka
B.Sc/B.Ed Degree Programme

Applied Mathematics – Level 03

ADE 3200– Applied Calculus I

No Book Test (NBT) – 2023/24

DURATION: ONE (01)–HOUR



Date: 01.09.2023

Time: 09.00 a.m.- 10.00 a.m.

ANSWER ALL QUESTIONS

1. a) Explain the following two forms of discontinuities and **provide an example** for each case.

i) Jump discontinuity (10 points)

ii) Removable discontinuity (10 points)

b) Consider the function $f(x) = \begin{cases} \log\left(\frac{x}{2} + b\right), & x < 8 \\ x\left(\sqrt{x-8} + \frac{1}{4}\right), & x \geq 8 \end{cases}$

Find b if $f(x)$ is continuous at $x = 8$. (10 points)

2. a) Find the derivative of the function $g(x) = (3 + x^3)^{\frac{2}{3}}$, at x . (05 points)

b) Consider the function $y = f(x) = \sqrt{x}$.

i) Find the derivative of the function $f(x) = \sqrt{x}$ at $x = 1$, using the first principles. (10 points)

ii) Is $f(x)$, a differentiable function? Give reasons for your answer. (15 points)

3. Let $y = f(x)$ where $f(x) = \frac{3x}{(x+2)(x-1)}$, $x \neq -2, 1$.

i) Find x -intercept and y -intercept of the graph of $y = f(x)$. (04 points)

ii) Write the equation/s of the vertical and horizontal asymptotes. (06 points)

iii) Determine the domain and range of the given function. (10 points)

iv) Sketch the curve $y = f(x)$. (20 points)