

School of Basic Sciences
Bachelor of Science Honours in Mathematics
Mid Term Examination - Nov 2023

Duration : 90 Minutes
Max Marks : 50

Sem I - C1UC102T - Differential and Integral Calculus

General Instructions

Answer to the specific question asked

Draw neat, labelled diagrams wherever necessary

Approved data hand books are allowed subject to verification by the Invigilator

- 1) Obtain the value of c for the hypotheses of Rolle's Theorem that satisfied on the given interval: $f(x) = x^2 - 8x + 15$ in $[3,5]$ K2 (2)
- 2) Find the 3rd derivative of $\frac{x^3}{x^2 - 3x + 2}$. K1 (3)
- 3) Show the concave up and concave down region of the function $f(x) = x^4 - 6x^3 + 12x^2 + 5x + 7$ also find the point of inflexion. K2 (4)
- 4) Explain the Maclaurin series of (i) $\sinh x$ and (ii) $x \sin x$ K2 (6)
- 5) Apply the Leibniz rule of differentiation to find the derivative of $e^{(ax+b)} \sin x$ K3 (6)
- 6) Trace the polar curve $r = ae^{\theta}$. K3 (9)
- 7) Simplify for nth derivative using the Leibnitz rule of successive differentiation for $y = x^2 \sin x$ at $x = 0$. K4 (8)
- 8) Trace the curve in cartesian coordinate system $y^2(a - x) = x^3, a > 0$. K4 (12)

OR

- Analyze the tracing of curve in cartesian coordinate system $y^2(a + x) = x^2(b - x)$. K4 (12)