00060

The Open University of Sri Lanka
Department of Mathematics
B.Sc./B.Ed. Degree Programme
No Book Test (NBT) - 2023/2024
Pure Mathematics - Level 05
PEU5304 - Introduction to Complex Analysis

Duration: One Hour

Date: 19.08.2023 **Time: 10.30 a.m. - 11.30 a.m.**

ANSWER ALL QUESTIONS.

1) (a) State the De Moivre's theorem for all positive integers.

Deduce that, the result is true even for any negative integer.

(b) Using the De Moivre's theorem,

(i) express $\left(-\frac{\sqrt{3}}{2}+\frac{i}{2}\right)^{43}$ in the Cartesian form.

(ii) obtain $cos\ 3\theta$ and $sin\ 3\theta$ respectively in terms of $cos\ \theta$ and $sin\ \theta$.

2) (a) Write down the n distinct roots of $[r_0(cos\theta_0 + isin\theta_0)]^{\frac{1}{n}}$, where n is a positive integer and $r_0 > 0$.

(b) Find the fourth roots of 1.

Hence, determine the primitive fourth roots of unity.

(c) (i) Prove that $log\ i^{\frac{1}{2}} = \frac{log\ i}{2}$.

(ii) Is $Log\ i^{\frac{1}{2}} = \frac{Log\ i}{2}$? Justify your answer.