INDIAN INSTITUTE OF SPACE SCIENCE AND TECHNOLOGY
THIRUVANANTHAPURAM 695 547

Quiz II - October 2022

B.Tech - III Semester

MA211 - Linear Algebra, Complex Analysis and Fourier Series

Date: 19/10/2022 **Time: 09.00 am - 10.00 am** **Max. Marks: 15**

Answer all questions.

1. Discuss the continuity, differentiability and analyticity of the following functions:
   (i) $f(z) = x^3 + i(y-1)^3$
   (ii) $f(z) = z\,\mathrm{Im}(z)$ [4]
2. Let $f(z) = u+iv$ be defined on a domain $D \subseteq \mathbb{C}$. Then prove or disprove the following: [3]
   (i) If u and v satisfy C-R equations on D, then f is analytic on D.
   (ii) If u and v satisfy C-R equations on D, then f is continuous on D.
   (iii) If u and v are harmonic on D, then f is differentiable on D.
3. Given $u = xy^3 - x^3y$, find $f(z) = u + iv$ such that f is analytic on $\mathbb{C}$. [3]
4. Evaluate $\displaystyle\int_C \frac{dz}{1+z}$, where C is any contour in the domain $D = \{z \in \mathbb{C} : \mathrm{Im}(z) > 0\}$, which joins $-1+i$ to $1+2i$. [3]
5. Find the principal value of $\sin^{-1}(-i)$. [2]

END