

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- 2024

Ph.D.- II Semester (Mathematics)

COURSE CODE (CREDITS):13P1WMA232 (3)

MAX. MARKS: 25

COURSE NAME: MATHEMATICAL ANALYSIS

COURSE INSTRUCTORS: SST

MAX. TIME: 1 Hour 30 Minutes

Note: (a) All questions are compulsory.

(b) Marks are indicated against each question in square brackets.

(c) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems.

1. State and prove the Lagrange's mean value theorem. Also, examine the validity of the hypothesis and the conclusion of the theorem for the function $f(x) = 2x^2 - 7x + 10$ on $[2,5]$. [3M+2M]
2. Show that the function $f(z) = |xy|^{1/2}$ is not analytic at the origin, although the Cauchy-Riemann equations are satisfied thereat. [4M]
3. Evaluate $\oint_C \frac{e^{2z} dz}{(z+1)^4}$, where C is $|z| = 3$. [4M]
4. State and prove Liouville's theorem for a function of a complex variable. [4M]
5. Prove that if $f(z)$ is a non-constant analytic function within and on a simple closed contour C , then $|f(z)|$ can not attain its maximum value in C unless it is a constant. [4M]
6. State and prove open mapping theorem for a function of complex variable. [4M]