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GIET UNIVERSITY, GUNUPUR - 765022

Ph.D. (Second Semester) Examinations, April - 2024

PPEMT2041 - Geometric Function Theory

(Mathematics)

Time: 3 hrs

Maximum: 70 Marks

The figures in the right-hand margin indicate marks.

Answer ANY FIVE Questions

(14 x 5 = 70 Marks)

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| 1. Investigate the properties of exponential and logarithmic functions in the complex plane. Discuss their behaviour, branch cuts, and how they relate to trigonometric functions in complex analysis. | 14 |
| 2. Prove the preservation of angles under conformal mapping rigorously. Use mathematical reasoning to demonstrate the conservation of angles in the transformed domain. | 14 |
| 3. Prove the Schwarz Lemma for univalent functions and analyze its implications on the behaviour of functions in the unit disk. Explore the fixed points and contraction properties. | 14 |
| 4. Prove the Koebe 1/4 theorem and analyze its implications on the structure of analytic functions. Discuss its use in estimating the size of images under holomorphic mappings. | 14 |
| 5. Analyze the impact of geometric function theory on complex analysis. Discuss its applications in studying the behaviour of analytic functions and mappings in the complex plane. | 14 |
| 6. Analyze real-world problems that can be addressed using concepts from geometric function theory. Provide examples where geometric function theory offers solutions in various disciplines. | 14 |
| 7. Apply geometric function theory to solve the Dirichlet problem on specific domains. Discuss the strategies and techniques involved in finding solutions using geometric function theory. | 14 |
| 8. Discuss the growth behaviour and boundary properties of univalent functions. Explore conditions for growth, convergence, and differentiability at the boundary of regions. | 14 |

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