Reg.No. \_\_\_\_\_\_\_\_\_\_\_\_



**UNIVERSITY**

(Karunya Institute of Technology & Sciences)

(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

**End Semester Examination – April/May– 2017**

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| **Code :** | **15MA3005** | **Duration :** | **3hrs** |
| **Sub. Name :** | **COMPLEX ANALYSIS** | **Max. marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| Q. No. | Sub Div. | Questions | Course  Outcome | Marks |
| 1. | a. | State and prove the chain rule in differentiability of complex analysis. | CO1 | 10 |
| b. | If , where the functions  and  have partial derivatives which are continuous and satisfy the Cauchy-Riemann equations at  then prove that  is differentiable at  and its derivative is =. | CO1 | 10 |
| (OR) | | | | |
| 2. | a. | State and prove the uniqueness theorem of power series of complex functions. | CO1 | 5 |
| b. | Calculate the modulus of the trigonometric functions  and . | CO1 | 10 |
| c. | Prove that . | CO1 | 5 |
| 3. | a. | If is a complex valued function whose domain contains , prove that . | CO1 | 10 |
|  | b. | If is a continuous real-valued function and on where is a unit circle then show that . | CO1 | 10 |
| (OR) | | | | |
| 4. | a. | Ifis analytic inside and on a positively oriented contour  and if  is the interior of  then prove that. | CO1 | 10 |
|  | b. | Ifwith , evaluate . | CO3 | 10 |
| 5. | a. | State and prove the local maximum principle. | CO3 | 10 |
|  | b. | If and are both analytic in a compact domain then show that takes maximum on the boundary. | CO3 | 10 |
| (OR) | | | | |
| 6. |  | Ifis analytic within the annulus , prove that has the series representation valid for , the coefficients are given by , where is the simple closed curve that lies entirely within  and has in its interior. | CO3 | 20 |
| 7. |  | Evaluate . | CO3 | 20 |
| (OR) | | | | |
| 8. | a. | Calculate the sum of the series . | CO3 | 8 |
|  | b. | Ifis an analytic function in a domain containing  and  then prove that is a conformal mapping and locally one-one at . | CO3 | 12 |
|  | | **Compulsory**: |  |  |
| 9. | a. | Prove that the bilinear transformation has at most two fixed points. | CO2 | 7 |
|  | b. | Evaluate a conformal mapping of the semicircular region  onto . | CO2 | 7 |
|  | c. | If  is a unique bilinear transformation that maps the distinct points  and onto the three distinct points  and  respectively, prove that  . | CO2 | 6 |

ALL THE BEST