

II B. Tech I Semester Supplementary Examinations, October/November - 2019
COMPLEX VARIABLES AND STATISTICAL METHODS
 (Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 70

- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
 2. Answer **ALL** the question in **Part-A**
 3. Answer any **THREE** Questions from **Part-B**

PART -A

1. a) Find all the values of 'k' such that $f(z) = e^x(\cos ky + i \sin ky)$ is analytic (4M)
- b) Evaluate $\int_{(1,-1)}^{(2,1)} (2x+iy+1)dz$ along the straight line joining (1,-1) to (2,1) (4M)
- c) Determine the residue of $ze^{z^2}/(z-1)^2$ at $z=1$ (3M)
- d) Find the Image of infinite strip $0 < y < 1/2$ under the transformation $w = 1/z$ (4M)
- e) If X is normally distributed with mean 30 and S.D 6 then find $P(32 < X < 41)$ (3M)
- f) Write the procedure to test the hypothesis (4M)

PART -B

2. a) If $u(x, y)$ & $v(x, y)$ are harmonic functions then prove that $\left(\frac{\partial u}{\partial y} - \frac{\partial v}{\partial x}\right) + i\left(\frac{\partial u}{\partial x} + \frac{\partial v}{\partial y}\right)$ is an analytic function (8M)
- b) Construct analytic function $f(z)$, whose imaginary part is $v(x, y) = \sin x \cosh y + 2 \cos x \sinh y + x^2 - y^2 + 4xy$ (8M)
3. a) Evaluate $\int_c \frac{dz}{(z-a)^n}$, ($n = 2, 3, 4, \dots$) $C: |z-a| = R > 0$ by Cauchy's Integral formula (8M)
- b) Obtain Taylor's series expansion of $\cosh z$ about $z = \pi i$ (8M)
4. a) Evaluate $\int_{-\infty}^{\infty} \frac{e^{ax}}{e^x + 1} dx$ using residue theorem (8M)
- b) Evaluate $\int_0^\pi \frac{d\theta}{17 - 8 \cos \theta}$ using residue theorem (8M)
5. a) Discuss the transformation $w = \sinh z$ (8M)
- b) Find the Bilinear transformation that maps $z(0, 1, \infty)$ onto $w(-5, -1, 3)$ (8M)

6. A professor 'x' feeling about mean mark in the final examination in statistics of large group of students is expressed subjectively by normal distribution with $\mu_0 = 67.2, \sigma_0 = 0.25$ (16M)
- If the mean mark lies in the interval (65.0 , 70.0) determine the prior probability the professor 'x' should assign to the mean mark
 - Find μ_1 & σ_1 if the exam is conducted for 40 students with mean 74.9 and S.D 7.4
 - Determine posterior probability the professor 'x' should assign to the mean mark being in the interval (65.0 , 70.0)
 - Construct 95% Bayesian interval for μ

7. a) From the following table test whether two attributes are independent at 1% level (8M)

Economic condition	I.Q.R	
	High	Low
Rich	460	140
Poor	240	160

- b) In sample of 500 in Rajahmundry 280 are consumed coffee and rest are tea .Can we assume both coffee and tea are equally popular test at 5% level (8M)

