

II B. Tech I Semester Supplementary Examinations, May/June - 2017
COMPLEX VARIABLES AND STATISTICAL METHODS
 (Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 70

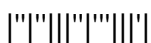
- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
 2. Answer **ALL** the question in **Part-A**
 3. Answer any **THREE** Questions from **Part-B**

PART -A

1. a) Show that both the real and imaginary parts of an analytic function are harmonic (3M)
- b) Evaluate $\oint_C (z-a)^n dz$, where C is simple closed curve and the point $z = a$ is inside C . (4M)
- c) Evaluate $\int_C \frac{e^{2z}}{(z+1)^3} dz$ using Residue theorem, where C is $|z|=2$ (4M)
- d) Find the bilinear transformation which maps the points $(-1, 0, 1)$ into the points $(0, i, 3i)$. (3M)
- e) Determine the expected number of random samples having their means (4M)
 - i) Between 22.39 and 22.41 ii) Greater than 22.42. if $\mu = 22.4, n = 36, \sigma = 0.48$
- f) A die is tossed 256 times and it turns up with an even digit 150 times. Is the die biased? (4M)

PART -B

2. a) Show that the function $f(x, y) = x^3y - xy^3 + xy + x + y$ can be the imaginary part of an analytic function of $z = x+iy$. Determine the real part and also the complex function. (8M)
 - b) Show that i) $f(z) = e^z$ ii) $f(z) = e^{-z}$ is analytic everywhere in the complex plane and find $f'(z)$. (8M)
3. a) Use Cauchy's integral formula to evaluate $\oint_C \frac{(z^4 - 3z^2 + 6)}{(z+i)^3} dz$ where C is the circle $|z|=2$. (8M)
 - b) Express $f(z) = \frac{z}{(z-1)(z-3)}$ in a series of positive and negative powers of $(z-1)$ (8M)



4. a) Evaluate $\int_C \frac{\coth z}{z-i} dz$ where C is $|z|=2$. (8M)
- b) Evaluate $\int_0^{\infty} \frac{x \sin mx}{x^4 + 16} dx$ using Residue theorem (8M)
5. a) Determine the bilinear transformations whose fixed points are 1,-1. (8M)
- b) Prove that the transformation $w=\sin z$ maps the families of lines $x = a$ and $x = b$ into two families of confocal central conics. (8M)
6. a) Samples of size 2 are taken from the population 3,6,9,15,27 with replacement. Find (8M)
- (i) The mean of the sampling distribution of means
- (ii) The standard deviation of the sampling distribution of means
- b) A sample of 10 cam shafts intended for use in gasoline engines has an average eccentricity of 1.02 and a standard deviation of 0.044 inch. Assuming the data may be treated a random sample from a normal population, determine a 95% confidence interval for the actual mean eccentricity of the cam shaft? (8M)
7. a) In an investigation on the machine performance ,the following result are obtained: (8M)

	No. of units inspected	No of defectives
Machine-1	375	17
Machine-2	450	22

Test whether is any significant performance of two machines at $\alpha = 0.05$

- b) A sample of 26 bulbs gives a mean life of 990 hours with a S.D of 20 hours. The manufacturer claims that the mean life of bulbs is 1000 hours is the sample not up to the standard. (8M)

