

Code No: R31021

R10

Set No. 1

IIIB.Tech I Semester Supplementary Examinations, October/November -2017

COMPLEX VARIABLES AND STATISTICAL METHODS

(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 75

Answer any FIVE Questions
All Questions carry equal marks

Statistical tables are required

1. a) Derive the Cauchy-Riemann equations if $f(z)$ is expressed in Polar coordinates. [8 M]
b) Find the analytic function $f(z) = u + iv$ where $u = e^x \sin y$. [7 M]
2. a) Evaluate $\int_0^{3+i} z^2 dz$ along the path the real axis to 3 and then vertically to $3+i$. [5 M]
b) Use Cauchy's integral formula to evaluate $\oint_C \frac{e^{3iz}}{(z+\pi)^3} dz$ where C is the circle $|z-\pi|=3$. [5 M]
c) Find the Laurent series of $f(z) = \frac{7z-2}{(z+1)z(z-2)}$ in the region $1 < |z+1| < 3$. [5 M]
3. a) Evaluate $\oint_C \frac{e^z}{\cos \pi z} dz$ Where C is The Circle $|z-i|=1.5$. [7 M]
b) Use residue theorem to evaluate $\int_{-\infty}^{\infty} \frac{x^2}{(x^2+1)(x^2+4)} dx$. [8 M]
4. a) Find and sketch the image of the region $-0.5 \leq x \leq 0.5, \frac{3\pi}{4} \leq y \leq \frac{5\pi}{4}$ under $w = e^z$. [7 M]
b) Determine the bilinear transformation that maps the points $z_1 = 0, z_2 = 2i, z_3 = -2i$ into the points $w_1 = -1, w_2 = 0, w_3 = \infty$ respectively. [8 M]
5. a) If the probability that a communication system will have high fidelity is 0.81 and the probability that it will have high fidelity and high selectivity is 0.18. What is the Probability that a system with high fidelity will also have high selectivity? [5 M]
b) Find the mean and variance of Binomial distribution. [5 M]
c) Calculate the mean and S.D of a normal distribution in which 31% are under 45 and 8% are over 64. [5 M]
6. a) If a 1-gallon can of paint covers on the average 513.3 square feet with a standard deviation of 31.5 square feet, what is the probability that the sample mean area covered by a sample of 40 of these 1-gallon cans will be anywhere from 510.0 to 520.0 square feet? [7 M]
b) Determine a 95% confidence interval for the mean of a normal distribution with variance $\sigma^2 = 0.25$, using a sample of $n = 100$ values with mean $\bar{x} = 212.3$. [8 M]

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7. a) An urban community would like to show that the incidence of breast cancer is higher than in a nearby rural area. If it is found that 20 of 200 adult women in the urban community have breast cancer and 10 of 150 adult women in the rural community have breast cancer, can we conclude at the 0.05 level of significance that breast cancer is more prevalent in the urban community? [7 M]
- b) A manufacturer claims that the average tensile strength of thread A exceed the average tensile strength of thread B by at least 12 kilograms. To test his claim, 50 pieces of each type of thread are tested under similar conditions. Type A thread had an average tensile strength of 86.7 kilograms with known standard deviation of $\sigma_A = 6.28$ kilograms, while type B thread had an average tensile strength of 77.8 kilograms with known standard deviation of $\sigma_B = 5.61$ kilograms. Test the manufacturers claim at 0.05 level of significance. [8 M]
8. a) Explain the test procedure for small sample test concerning difference between two means. [7 M]
- b) Construct and Explain two-way analysis of variance table. [8 M]
