

II B. Tech I Semester Supplementary Examinations, September - 2021
COMPLEX VARIABLES AND STATISTICAL METHODS
 (Civil Engineering)

Time: 3 hours

Max. Marks: 75

Answer any **FIVE** Questions each Question from each unit
 All Questions carry **Equal** Marks

- 1 a) Evaluate $\int_{1,1}^{(2,4)} (x^2 + ixy) dz$ along the curve $x = t, y = t^2$. [8M]
 b) Prove that $f(z) = z + 2\bar{z}$ is not analytic anywhere in the complex plane. [7M]

Or

- 2 a) Show that $f(z) = \bar{z}$ is not differentiable at $z = 0$. [8M]
 b) Evaluate $\int_C \frac{ze^z}{(z-a)^3} dz$ where 'a' lies within a closed curve by Cauchy integral formula. [7M]
 3 a) Obtain Laurent's expansion for $f(z) = \frac{1}{(z+2)(1+z)^2}$ in $|1+z| > 1$. [8M]
 b) Expand $f(z) = \cos z$ about $z = \pi/4$ as a Taylor's expansion. [7M]

Or

- 4 a) Evaluate $\int_0^{2\pi} \frac{1}{13+5\sin\theta} d\theta$ [8M]
 b) Evaluate $\int_C \tan z dz$ where $C: |z| = 2$ using Residue's theorem. [7M]
 5 a) A random variable x has the following probability function: [8M]

x	0	1	3	4	5	6	7
$P(x)$	0	k	2k	2k	3k	k^2	$7k^2+k$

 (i) Find the value of k (ii) evaluate $P(x < 6)$.

- b) A continuous random variable has the probability density function [7M]

$$f(x) = \begin{cases} kxe^{-\lambda x}, & \text{for } x \geq 0, \lambda > 0 \\ 0, & \text{otherwise} \end{cases}$$
 Determine (i) k (ii) Mean

Or

- 6 a) Average number of accidents on any day on a national highway is 1.8. [7M]
 Determine the probability that the number of accidents is (i) at least one (ii) at most one
 b) In a Normal distribution, 7% of the item are under 35 and 89% are under 63. [8M]
 Find the mean and standard deviation of the distribution
 7 Samples of size 2 are taken from the population 3,6,9,12 without replacement. Find [15M]
 (i) The mean of the population
 (ii) The standard deviation of the population
 (iii) Mean of the sampling distribution of means
 (iv) The standard deviation of the sampling distribution of means

Or



- 8 a) A random sample of size 100 is taken from normal population having mean 76 and variance 256. What is the probability that \bar{x} will be between 75 and 78. [8M]
b) Define chi-square distribution and write its properties. [7M]
- 9 a) In a big city 325 men out of 600 men were found to be smokers. Does the information support that 50% of men in the city are smokers. Test the claim at 10% level. [8M]
b) Define errors in sampling with suitable examples. [7M]
- Or
- 10 a) A sample of 26 bulbs gives a mean life of 990 hours with 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 at 5% level of significance. [7M]
b) The no. of automobile accidents per week in a certain area as follows: 12,8,20,2,14,10,15,6,9,4 . Are these frequencies in agreement with the belief that accidents were same in the during last 10 weeks. Test at 5% level [8M]

