

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, June - 2024

COMPLEX VARIABLES AND STATISTICAL METHODS
(EEE)

Time: 3 hours

Max. Marks: 70

Answer ONE Question from each Unit

All Questions Carry Equal Marks

Q. No.	Questions	BTL	CO	Marks
UNIT – I				
1.	a) Prove that $\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2}\right) \text{Real } f(z) ^2 = 2 f'(z) ^2$ where $w = f(z)$ is analytic function.	K3	CO1	7M
	b) Show that $u(x,y) = e^{2x} (x \cos 2y - y \sin 2y)$ is harmonic and Obtain its harmonic conjugate.	K3	CO1	7M
OR				
2.	Prove that the function $f(z)$ defined by $f(z) = \begin{cases} \frac{x^3(1+i)-y^3(1-i)}{x^2+y^2}, & (z \neq 0) \\ 0, & (z = 0) \end{cases}$ is continuous and the Cauchy – Riemann are satisfied at the origin, yet $f'(0)$ does not exist.	K3	CO1	14M
UNIT – II				
3.	a) Obtain the Taylor's series to represent the function $\frac{z^2-1}{(z+2)(z+3)}$ in the region $ z < 2$.	K3	CO2	7M
	b) Obtain the Laurent series expansion of the function $f(z) = \frac{z^2-6z-1}{(z-1)(z-3)(z+2)}$ in the region $3 < z+2 < 5$.	K3	CO2	7M
OR				
4.	Show that by the method of residues, $\int_0^\pi \frac{d\theta}{a+b\cos\theta} = \frac{\pi}{\sqrt{a^2-b^2}} (a > b > 0)$.	K3	CO2	14M
UNIT – III				
5.	a) Two dice are thrown. Let X assign to each point (a, b) in S the maximum of its numbers i.e., $x(a, b) = \max(a, b)$. Obtain the probability distribution. X is a random variable with $X(s) = \{1, 2, 3, 4, 5, \text{ and } 6\}$. Also obtain the mean of the distribution.	K3	CO3	7M
	b) Probability density function of a random variable X is $f(x) = \begin{cases} \frac{1}{2} \sin x, & \text{for } 0 \leq x \leq \pi \\ 0, & \text{elsewhere} \end{cases}$ obtain the mean, mode of the distribution and also obtain the probability between 0 and $\pi/2$.	K3	CO3	7M
OR				

6.	a)	An insurance company found that only 0.01% of the population is involved in a certain type of accident each year. If its 1000 policy holders were randomly selected from the population, obtain the probability that not more than two of its clients are involved in such an accident next year?	K3	CO3	7M
	b)	The marks obtained in mathematics by 1000 students are normally distributed with mean 78% and standard deviation 11%. Determine (i) How many students got marks above 90 %? (ii) What was the highest mark obtained by the lowest 10% of the students?	K3	CO3	7M
UNIT – IV					
7.	Sample of size 2 are taken from the population 3, 6, 9, 15, 27 without replacement. Obtain (a) The mean of the population (b) The standard deviation of the population (c) The mean of the sampling distribution of means and (d) The standard deviation of sampling distribution of means.		K3	CO4	14M
OR					
8.	a)	Suppose in certain college, the average (mean) weight of all male students is 60 kg and standard deviation is 25 kg. If a sample of 36 male students is selected at random, obtain the probability that the male students having average weight (i) more than 70 kg (ii) less than 55 kg (iii) between 50 kg and 65 kg.	K3	CO4	7M
	b)	The efficiency expert of a computer company tested 40 engineers to estimate the average time it takes to assemble a certain computer component getting a mean of 12.73 minutes and S.D of 2.06 minutes. Construct 98%, 99% confidence intervals for the true average time it takes to do the job and comment on it.	K3	CO4	7M
UNIT – V					
9.	a)	20 people were attacked by a disease and only 18 survived. Will you reject the hypothesis that the survival rate if attacked by this disease is 85% in favor of the hypothesis that is more at 5% level of significance?	K3	CO5	7M
	b)	The average hourly wage of a sample of 150 workers in a plant A was Rs.2.56 with a standard deviation of Rs.1.08. The average hourly wage of a sample of 200 workers in plant B was Rs.2.87 with a standard deviation of Rs.1.28. Can an applicant safely assume that the hourly wages paid by plant B are higher than those paid by plant A?	K3	CO5	7M
OR					
10.	a)	An ambulance service claims that it takes on the average less than 10 minutes to reach its destination in emergency calls. A sample of 36 calls has a mean of 11 minutes and the variance of 16 minutes. Test the claim at 0.05 level of significance.	K3	CO5	7M
	b)	Random samples of 400 men and 600 women were asked whether they would like to have a flyover near their residence. 200 men and 325 women were in favor of the proposal. Test the hypothesis that proportions of men and women in favor of the proposal are same against that they are not at 5% level.	K3	CO5	7M