O.P.Code: 23HS0837	R23	H.T.No.									

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech. II Year II Semester Regular Examinations July/August-2025

COMPLEX VARIABLES, PROBABILITY AND STATISTICS

(Mechanical Engineering)

Time: 3 Hours **Max. Marks: 70**

PART-A

(Answer all the Questions **10 x 2 = 20** Marks)

1	a	State Cauchy-Riemann (C-R) equations in cartesian coordinates.	CO1	L1	2M
	b	Prove that $f(z)=\overline{z}$ is not an analytic at any point.	CO1	L5	2M
	c	State Cauchy Integral formula.	CO2	L1	2M
	d	State Cauchy Residue theorem.	CO2	L1	2M
	e	State Baye's theorem.	CO3	L1	2M
	f	Define expected value of a discrete random variable.	CO3	L1	2M
	g	State the formula for Binomial distribution.	CO4	L1	2M
	h	A coin is tossed 9 times. Find the probability of getting 5 heads.	CO4	L1	2M
	i	The variance of a population is 2. The size of the sample collected from the population is 169. What is the standard error of mean?	CO5	L1	2M
	j	What is a Statistical hypothesis?	CO5	L1	2M

PART-B

(Answer all Five Units **5 x 10 = 50** Marks)

UNIT-I

2		Show that the function $u=4xy-3x+2$ is harmonic. Construct the corresponding analytic function interms of 'z' .	CO1	L1	10M

OR

3	a	Show that z^2 is an analytic for all z.	CO1	L2	5M
	b	Find the analytic function whose imaginary part is $\frac{x-y}{x^2+y^2}$.	CO1	L1	5M

UNIT-II

4	a	Evaluate $\int_0^{1+i} x^2-iy\,dz$ along the path y=x.	CO2	L5	5M
	b	Evaluate $\int_c \frac{e^{2z}}{(z-1)(z-2)}dz$ where c is $\lvert z\rvert=3$	CO2	L5	5M

OR

5	a	Expand $f(z)=\frac{1}{z^2-z-6}$ in Taylor's series about $z=-1$	CO2	L2	5M
	b	Evaluate $\int_0^{2\pi} \frac{d\theta}{2+\cos\theta}$	CO2	L5	5M

UNIT-III

6		In a certain college 25% of boys and 10% of girls are studying mathematics. The girls Constitute 60% of the student body. (i) What is the probability that mathematics is being studied? (ii) If a student is selected at random and is found to be studying mathematics, find the probability that the student is a girl? (iii) a boy	CO3	L1	10M

OR

7	a	Two cards are selected at random from 10 cards numbered 1 to 10. Find the probability that the sum is even if (i) The two cards are drawn together. (ii) The two cards drawn one after other with replacement.	CO3	L4	5M
	b	The probability that students A,B,C,D solve the problem are $\frac{1}{3},\frac{2}{5},\frac{1}{5} and \frac{1}{4}$ respectively If all of them try to solve the problem, What is the probability that the problem is solved?	CO3	L1	5M

UNIT-IV

8	a	Out of 800 families with 5 children each, how many would you expect to have (i) 3 boys (ii) 5 girls (iii) either 2 or 3 boys. Assume equal probabilities for boys and girls.	CO4	L2	5M
	b	Derive mean and variance of Binomial distribution.	CO4	L3	5M

OR

9		If the masses of 300 students are normally distributed with mean 68kgs and standard deviation 3kgs.How many students have masses i) Greater than 72kgs ii) Less than or equal to 64kg iii) Between 65 and 71 kgs inclusive.	CO4	L3	10M

UNIT-V

10		A population consists of six numbers 4,8,12,16,20,24 consider all samples of size two which can be drawn without replacement form the population. Find i) The population mean ii) The population standard deviation iii) The mean of the sampling distribution of means iv) The standard deviation of the sampling distribution of means.	CO5	L3	10M

OR

11	a	Experience had shown that 20% of a manufactured product is of top quality. In one day's production of 400 articles only 50 are of top quality. Test the hypothesis at 0.05 level.	CO5	L4	5M
	b	The means of two large samples of sizes 1000 and 2000 members are 67.5inches and 68.0 inches respectively. Can the samples be regarded as drawn from the same population of standard deviation 2.5 inches?	CO5	L4	5M

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