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

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
B.Tech. II Year II Semester Regular & Supplementary Examinations March/April-2026
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	Define harmonic function.	CO1	L1	2M
	C	State Cauchy's integral theorem.	CO2	L1	2M
	d	State Cauchy Residue theorem.	CO2	L1	2M
	E	Define Probability.	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	State Normal probability density formula.	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	Write about i) Null hypothesis ii) Alternative hypothesis.	CO5	L1	2M

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

UNIT-I

2		Verify $u = x^2 - y^2 - y$ that is harmonic in the whole complex plane and find a conjugate harmonic function v of u?	CO1	L4	10M

OR

3	a	Find the analytic function f(z) interms of z whose real part is $\mathbf{x^3 - 3xy^2}$	CO1	L1	5M
	b	Find the analytic function whose imaginary part is $\mathbf{e^x(x \sin y + y \cos y)}$	CO1	L1	5M

UNIT-II

4		Show that $\int_c (z+1)dz = 0$ where 'c' is the boundary of the square whose vertices at the points $z = 0, z = 1, z = 1 + i, z = i$.	CO2	L1	10M

OR

5	a	Evaluate $\int_{(0,0)}^{(1,3)} \mathbf{3x^2ydx + (x^3 - 3y^2)dy}$ along the curve $\mathbf{y = 3x}$.	CO2	L5	5M
	b	Evaluate $\int_0^{1+i} (x^2 - iy)dz$ along the path $y = x$.	CO2	L5	5M

UNIT-III

6		A random variable X has the following probability function	CO3	L5	10M

X	0	1	2	3	4	5	6	7
P(x)	0	K	2K	2K	3K	K2	2K2	$7K^2+K$

Determine (i) K (ii) Evaluate P(X≥6) (iii)Evaluate P(0<X<5) (iv)Find Mea

OR

7		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

UNIT-IV

8	a	Fit a Binomial distribution to the following frequency distribution:	CO4	L3	6M

x	0	1	2	3	4	5
f	2	14	20	34	22	8

	b	The mean and variance of a binomial distribution are 4 and 3,FindP(x≥1).	CO4	L1	4M

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 The standard deviation of the sampling distribution of means.	CO5	L3	10M

OR

11		A sample of the height of 6400 Englishmen has a mean of 67.85 inches and a standard deviation of 2.5 inches while a simple sample of height of 1600 Australians has a mean of 68.55 inches and a standard deviation of 2.52 inches. Do the data indicate the Australians are on the average taller than the Englishmen?	CO5	L4	10M

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