Sub Code: R2021021 **R20** **Set No. 1**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY-GURUJADA VIZINAGARAM
II B. Tech I Semester Supplementary Examinations, November – 2024
MATHEMATICS-IV
(EEE)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions
ONE Question from Each unit
All Questions Carry Equal Marks
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1	a)	Determine whether $f(z) = \frac{1}{2}log(x^2 + y^2) + i\,tan^{-1}(y/x)$ is analytic	[7]
	b)	Show that $f(z) = \begin{cases} \frac{(x^3+y^3)+i(x^3+y^3)}{x^2+y^2}, z \neq 0 \\ 0, z = 0 \end{cases}$ Is not analytic at $z = 0$ although C-R equations are satisfied at origin.	[8]
		(OR)	
2	a)	Evaluate $\int_c \frac{z+2}{z} dz$ *where* C *is the semi circle* $z = 2e^{i\theta}$ $0 \leq \theta \leq \pi$	[7]
	b)	Show that $u(x, y) = e^x cos\, y$ is Harmonic. Find its Harmonic Conjugate	[8]
3	a)	Find the Laurent's series of f(z) $= \frac{z}{z^2(z+i)}$ for $z = -i$	[7]
	b)	Evaluate $\oint_C \frac{Sin\,\pi z^2 + Cos\,\pi z^2}{(z-2)(z-1)^2} dz$ Where c: |z| = 2 using Residue theorem	[8]
		(OR)	
4	a)	Find the singularity of f(z) = ze^{1/z^2}	[7]
	b)	Evaluate $\int_0^{2\pi} \frac{1}{5+4\,cos\,\theta} d\theta$ using Residue theorem	[8]
5	a)	Find the mean and variance of $f(x) = ce^{-\|x\|}, -\infty < x < \infty$	[7]
	b)	The weight of 100 male students are normally distributed with mean 120 and S.D 20 pounds. Find the number of students whose weights are (i) Between 90 and 130 pounds. (ii) More than 120 pounds	[8]
		(OR)	
6	a)	The mean and variance of a binomial variable X with parameters n and p are 16 and 8. Find $P(X \geq 1)$ and $P(X < 1)$.	[7]
	b)	Find (i) P(1< x < 8) (ii) P(x≥ 1) for the data that 2% of light bulbs are defective in a sample of 100.	[8]
7	a)	Samples of size 2 are taken from the population {4,8,12,16} without replacement. Find (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	[15]

(OR)

8 a) A random sample of 200 items is found to have mean 81 and S.D of 21.Find the maximum error of estimation at 95% confidence interval. [7]

b) Find P (X > 66.75) if a random sample of size 36 is drawn from an infinite population with mean 63 and S.D is 9. [8]

9 a) Experience had shown that 20% of a manufactured product is of the top quality. In one day's, production of 400 articles only 50 are of top quality. Test the hypothesis at 0.05 level. [7]

b) Test whether the differences of means for the following data is significant at 5% level. [8]

	Mean	S. D	Size of Sample
Sample A	40	15	50
Sample B	50	18	60

(OR)

10 a) In a one sample of 10 observations the sum of squares of deviations from mean was 90 and other sample of 12 observations it was 108 .test whether the difference of variances is significant at 5% level of significance [7]

b) A die is thrown 264 times with the following results. show that the die is unbiased at 5% level. [8]

No appeared on die	1	2	3	4	5	6
Frequency	40	32	28	58	54	52

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