Code No : **19SHT301**

R19

II B. TECH I SEMESTER SUPPLEMENTARY EXAMINATIONS, FEB - 2022
COMPLEX VARIABLES AND STATISTICAL METHODS
(Common to CE, EEE, ME and ECE)

Time : 3 Hours   **Max. Marks : 60**
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Note : Answer **ONE** question from each unit (**5 × 12 = 60 Marks**)
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UNIT-I

1. a) **Show** that the function $f(z) = \sqrt{|xy|}$ is not analytic at the origin [6M] although Cauchy-Riemann equations are satisfied at that point.

    b) **Show** that $e^{2x}(x \cos 2y - y \sin 2y)$ is harmonic. Find the conjugate [6M] harmonic function of it.

(OR)

2. a) **Identify** analytic function $f(z) = u(x, y) + iv(x, y)$ if [6M]

    $$u - v = \frac{\cos x + \sin x - e^{-y}}{2\cos x - e^{y} - e^{-y}} \text{ and } f(\frac{\pi}{2}) = 0.$$

    b) **Evaluate** $\int_{c} \frac{e^{z}}{(z^{2} + \pi^{2})} dz$ where C is $|z|=4$ using Cauchy's integral [6M] theorem.

UNIT-II

3. a) **Identify** the Laurent's expansion for f(z)= $\frac{z^{2}-1}{(z+2)(z+3)}$ for $|z|>3$. [6M]

    b) **Identify** the residue of $\frac{1-e^{2z}}{z^{4}}$ at these singular points which lie [6M] inside the circle $|z|=2$.

(OR)

4. a) Expand $f(z) = \frac{1}{(z-1)(z-2)}$ in the region $1 < |z| < 2$. [6M]

    b) **Identify** the Laurent's expansion of $\frac{7z-2}{(z+1)(z-2)}$ in the region [6M] $1 < z+1 < 3$.

UNIT-III

5. a) In a bolt factory there are 3 machines A, B, C manufacturing 30%, [6M] 35% and 35% of the total output respectively. Of their outputs 5%, 4% and 2% respectively are defective bolts. A bolt is chosen at random from the factories production and is found defective. **Predict** the probability that bolt was manufactured by machine A or machine C.

    b) **Determine** the binomial distribution for which mean =2 (variance) [6M] and mean + variance =3 then find P(x≤3).

6. a) The income of a group of 10000 persons was found to be normally [6M] distributed with mean root is 750 per month and S.D. of rupees 50. **Show** that of this group about 95% had income exceeding rupees 668 and only 5% had income exceeding rupees 832.

   b) **Make use** of the following data and fit a Poisson distribution to the [6M] following data give the no of yeast cells per square for 400 squares.

No of cells per Square	0	1	2	3	4	5	6	7	8	9	10
No of squares.	103	143	98	42	8	4	2	0	0	0	0

UNIT-IV

7. a) A manufacturer claimed that at least 95% of the equipment which he [6M] supplied to a factory conformed to specifications. An examination of a sample of 200 pieces of equipment's revealed that 108 were faulty. **Test** this claim at a significant level of (i)0.05, (ii)0.10.

   b) A manufacture claims that only 4% of his products are defective. A [6M] random sample of 500 were taken among which 100 were defective. **Test** the hypothesis at 0.05 level.

(OR)

8. a) The mean weight of 45 male students is 70 kgs with a S.D. of 10 kgs . [6M] Mean weight of another set of 80 students is 68 kgs with S.D. of 15 kgs . **Test** the hypothesis the weight of I set of male students is greater than the 2nd set of male students.

   b) It is claimed that a random sample of 49 tyres has a mean life of [6M] 15200 km. This sample was drawn from a population whose mean is 15150 kms and a S.D. of 1200 km . **Test** the significance at 0.05 level.

UNIT-V

9. a) **Apply** method of least squares, find a straight line that best fits the [6M] following data points.

x	0	1	2	3	4
y	1	1.8	3.3	4.5	6.3

   b) **Calculate** the coefficient of correlation from the following data; given [6M] ranks of 10 students in English and Mathematics

Rank in English	3	1	5	4	2	6	8	10	9	7
Rank in Mathematics	2	4	3	1	5	10	7	9	8	6

(OR)

10. a) In a partially destroyed laboratory record, only the lines of regression [6M] of y on z and x on y are available as *4x-5y + 33=0* and *20x-9y =107* respectively. **Calculate** $\bar{x}, \bar{y}$ and the coefficient of correlation between x and y.

    b) **Make use** of the following data and fit a second degree parabola to [6M] the following data

x	1	1.5	2	2.5	3	3.5	4
y	1.1	1.3	1.6	2	2.7	3.4	4.1

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