

[Total No. of Questions: 09]
Uni. Roll No.

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Program: B.Tech.(2018 batch onwards)
Semester: 3rd
Name of Subject: Mathematics-III
Subject Code: BSCS-101
Paper ID: 16013

EVENING
05 MAR 2021

Time Allowed: 03 Hours

Max. Marks: 60

NOTE:

- 1) Parts A and B are compulsory.
- 2) Part -C has Two questions Q8 and Q9. Both are compulsory, but with internal choice.
- 3) Any missing data may be assumed appropriately.
- 4) Scientific calculator is allowed.

Part -A

[Marks:02 each]

Q1.

- a) Write Cauchy-Riemann Equations in Cartesian form .
- b) Discuss Gauss Elimination method for solving three equations in x, y, z .
- c) Evaluate $\int_0^{1+i} z dz$ along the path $y = x$.
- d) Write algorithm for straight line fit of a curve.
- e) Check the correctness of the statement, "Mean of a binomial distribution is 15 and variance is 25."
- f) A coin was tossed 400 times and the head turned up 216 times. Test the hypothesis that the coin is unbiased.

Part -B

[Marks: 04 each]

Q2. Fit the curve $y = a + bx$ to the following data :

x	10	12	15	23	20
y	14	17	23	25	21

Q3. Expand $f(z) = \frac{1}{(z+1)(z+3)}$ in the region $1 < |z| < 3$.

Q4. Solve the following equations by Gauss Elimination method :

$$2x - 2y + z = 1, \quad x + 2y + 2z = 2, \quad 2x + y - 2z = 7.$$

Q5. The nine items of a sample have the following values : 45,47,50,52,48,47,49,53,51.

Does the mean of these differ significantly from the assumed mean 47.5? ($t_{0.05} = 2.31$)

Q6. The probability that a man hits a target, when he fires is $1/5$. If he fires 10 rounds, what is the probability of his hitting the target at least twice?

Q7. If $f(z) = u + iv$ is an analytic function and $u - v = e^x(\cos y - \sin y)$, find $f(z)$.

Part -C

[Marks: 12 each]

Q8. (a) Evaluate $\int_0^{2\pi} \frac{d\theta}{(5-3\cos\theta)^2}$ using contour integration .

OR

(b) Evaluate the integral $\oint_c \frac{12z-7}{(z-1)^2(2z+3)} dz$, using Cauchy residue theorem,

where c is the circle given by (i) $|z|=2$ (ii) $|z+i|=\sqrt{3}$.

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Q9. (a) Fit a Poisson distribution to the following data and test the goodness of fit :

x	0	1	2	3	4
f	109	65	22	3	1

(Given that $\chi_{0.05}^2 = 7.815$)

OR

(b) i) Consider the random variable X which assigns the maximum of the number showing on a pair of dice. Find $E(X)$ and $\text{Var}(X)$.

ii) Let X be a continuous random variable with probability density function

$$f(x) = \begin{cases} \frac{x}{6} + k, & 0 \leq x \leq 3 \\ 0, & \text{elsewhere} \end{cases}$$

Evaluate k and $P(1 \leq X \leq 2)$.
