Please check that this question paper contains 9 questions and 2 printed pages within first ten minutes.

[Total No. of Questions: 09] [Total No. of Pages: 02]

Uni. Roll No. .....

Program/ Course: B.Tech (Batch 2018 onward)
Semester: 3rd
Name of Subject: Mathematics-III
Subject Code: BSCS-101
Paper ID: 16013
Scientific Calculator is Allowed

MORNING
09 MAY 2023

Time Allowed:3 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.

Part -A **[Marks:02 each]**

Q1.

a) Separate $\cos z$ into real and imaginary parts.

b) Solve the system of equations : $2x+3y=5$, $7x-2y=5$.

c) Evaluate $\int_C \frac{dz}{(z-1)^2}$ where C is the circle $|z+i|=1/2$.

d) Write algorithm for straight line fit of a curve.

e) Check the correctness of the statement, " Mean of a binomial distribution is 5 and variance is 9."

f) A normal population has a mean of 6.8 and standard deviation of 1.5. A sample of 400 members gave a mean 6.75. Is the difference significant? (tabulated value = 1.96)

Part -B **[Marks: 04 each]**

Q2. Fit the curve $y=ax+b$ to the following data :

x	1	2	3	4	5
y	1	5	11	8	14

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 :
$4x-5y+z=2$, $3x+y-2z=9$, $x+4y+z=5$.

Q5. Annual rainfall at a certain place is normally distributed with mean 45cm. The rainfalls for the last five years are 48cm, 42cm, 40cm, 44cm and 43cm. Can it be concluded that the average rainfall during last five years is less than the normal rainfall?
(tabulated value = 2.976)

Q6. The probability of a man hitting a target is 1/4. If he fire 7 times, what is the probability of his hitting the target at least twice?

Q7. If $f(z) = u + iv$ is an analytic function and $u = x^4 - 6x^2y^2 + y^4$, find $f(z)$.

Part -C [Marks: 12 each]

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Q8.(a) Evaluate $\int_0^{2\pi} \frac{\cos 3\theta}{(5-4\cos\theta)}\, d\theta$ using contour integration .

OR

(b) Evaluate $\int_C \frac{12z-7}{(z-1)^2(2z+3)}\, dz$, where C is $|z+i| = \sqrt{3}$, using Cauchy residue theorem.

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

x	0	1	2	3	4
f	122	60	15	2	1

(tabulated value = 7.82)

OR

(b) i) 2 bad eggs are mixed with 10 good eggs. Find the probability distribution of the number of bad eggs, if 3 eggs are drawn at random from this lot.

ii) The mean yield of two sets of plots and their variability are as given. Examine whether the difference in the variability in yields is significant?

	Set of 1000 plots	Set of 1200 plots
Mean yield per plot	67.42	67.25
S.D. per plot	2.58	2.50

(tabulated value = 1.96)

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