PAPER ID-311325

Subject Code: RAS301

Roll No: | | | | | | | | | | | | | |

BTECH
(SEM III) THEORY EXAMINATION 2023-24
MATHEMATICS-III

TIME: 3HRS **M.MARKS: 70**

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. **2 x 7 = 14**

a.	Discuss singularity of $\frac{\cos \pi z}{(z-a)^2}$ at z=a & z = ∞.
b.	Define conjugate functions.
c.	Write formula for t test.
d.	Find angle between two lines of regression.
e.	Prove that $\left(E^{1/2}+E^{-1/2}\right)(1+\Delta)^{1/2} = 2+\Delta$
f.	Apply Euler's method to solve $\frac{dy}{dx} = e^x + xy$, y(0) = 0 to compute y(0.1) for h=0.1
g.	If Fourier Transform of $e^{-x^2} = \sqrt{\pi} e^{-(p^2/4)}$ then find Fourier Transform of $e^{-x^2}\cos 2x$.

SECTION B

2. Attempt any *three* of the following: **7 x 3 = 21**

a.	Verify Cauchy theorem by integrating e^{iz} along the boundary of the triangle with the vertices at the points 1+i , -1+i & -1-i .
b.	To test the effectiveness of inoculation against cholera, the following table was obtained:

	Attacked	Not attacked	Total
Inoculated	30	160	190
Not inoculated	140	460	600
Total	170	620	790

(The figures represent the number of persons)

Use χ^2-test to defend or refute the statement that that the inoculation prevents attack from cholera. ($\chi_{0.05}^2$ *for* $1 d.f. = 3.841$).

c.	Solve $x^3 - 5x + 3 = 0$ using Regula Falsi method.
d.	Solve the following system of equations by Gauss Seidal iterative method: $83x + 11y - 4z = 95$, $7x + 52y + 13z = 104$, $3x + 8y + 29z = 71$.
e.	Solve by Z transform $y_{k+1} = 7\, y_k + 10\, x_k$, $x_{k+1} = y_k + 4\, x_k$; $y_0 = 3$, $x_0 = 2$

SECTION C

3. Attempt any *one* part of the following: **7 x 1 = 7**

PAPER ID-311325

Roll No: | | | | | | | | | | | | | |

BTECH
(SEM III) THEORY EXAMINATION 2023-24
MATHEMATICS-III

TIME: 3HRS **M.MARKS: 70**

	a.	Find the Taylor's and Laurent's series which represent the function $f(z)=\frac{z^2-1}{(z+2)(z+3)}$ when **(i)** $\lvert z\rvert<2$ and **(ii)** $2<\lvert z\rvert<3$.
	b.	Evaluate by using contour integration $\int_0^\infty \frac{\cos ax}{x^2+1}dx$; $a\geq 0$

4. Attempt any *one* part of the following: 7 x 1 = 7

	a.	Define skewness and kurtosis of a distribution. Discuss kurtosis for the following frequency distribution.

Class Interval	0-10	10-20	20-30	30-40
Frequency	1	3	4	2

	b.	Define level of significance. Show that in a poisson distribution with unit mean, mean deviation about mean is (2/e)times the standard deviation.

5. Attempt any *one* part of the following: 7 x 1 = 7

	a.	Using the following table, find $f(x)$ as a polynomial in x :

x	-1	0	3	6	7
$f(x)$	3	-6	39	822	1611

	b.	Using Newton-Raphson formula, find a root of $f(x)=x^3+2x^2+10x-20$ up to four decimal places.

6. Attempt any *one* part of the following: 7 x 1 = 7

	a.	Evaluate $\int_0^1 \frac{1}{1+x^2}dx$ using i) Simpson's one-third rule taking h=$\frac{1}{4}$ ii) Simpson's three eighth rule taking h=$\frac{1}{6}$.
	b.	Given the initial value problem $u'=-2tu^2$, u(0)=1 with h= 0.2 on the interval [0,0.4]. Use Runge-Kutta fourth-order method.

7. Attempt any *one* part of the following: 7 x 1 = 7

	a.	Find Z-transform of sin(3k+5)
	b.	Using Fourier sine integral, show that $\int_0^\infty \frac{(1-\cos\pi\lambda)\sin x\lambda\, d\lambda}{\lambda}=$ $\begin{cases}\frac{\pi}{2} & when\ 0<x<\pi,\\ 0 & x>\pi\end{cases}$