Subject Code: RAS301

PAPER ID-311794

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

BTECH
(SEM III) THEORY EXAMINATION 2024-25
MATHEMATICS-III

TIME: 3 HRS **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.	Write sufficient condition for f(z) to be analytic.
b.	State Cauchy's integral theorem.
c.	Define Kurtosis.
d.	Write Binomial distribution.
e.	State Newton's divided difference formula.
f.	Describe Newton's one-third rule.
g.	Define Z-transform. or Define complex fourier transform.

SECTION B

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

a.	Show that the function u = ½ log(x^2 +y^2) is harmonic function.
b.	Using method of Least squares, find the curve y = a + b x^2 that best fit the following data:
c.	Using Euler's modified method solve dy/dx = x+3y with the initial condition that y=1 when x=0 and hence find y for x = 1.
d.	Use Runge-Kutta method of fourth order, solve 5 $\frac{dy}{dx}$ = x^2+y^2 with y(0) = 1, at x = 0.2 taking h = 0.1.
e.	Find the Fourier transform of e^{-ax^2} , where a > 0. or Find the Z-transform of cosh ($\frac{k\pi}{2} + \alpha$) .

x	-1	0	1	2
y	2	5	3	0

SECTION C

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

a.	Evaluate the following integral using Cauchy integral formula $\int \frac{4-3z}{z(z-1)(z-2)}$ dz, where C is the circle |z| = 3/2 .
b.	Expand $\frac{1}{z^2-3z+2}$ in the region |z| <1.

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

a.	If 10% of bolts produced by a machine are defective. Determine the probability that out of 10 bolts, chosen at random i) 1 ii) none iii)at most two bolts will be defective.
b.	If there are three misprints in a book of 1000 pages find the probability that a given page will contain i) no misprints ii) more than 2 misprints.

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

a.	By using Newton-Raphson method, find the root of x^3- 2x + 0.5 = 0.
b.	Using Lagrange's interpolation formula, find the values of y corresponding to x=3 from the following table:

x	0	1	2	4
y	580	556	520	385

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

a.	Solve by Crout's method, the following system of equation : 3x +2y+7z = 4 , 2x –+3y +z = 5 , 3x + 4y + z = 7.
b.	Using Picard's method find a solution of $\frac{dy}{dx}$ = x+y^2 ; y(0) = 1.

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

a.	Find the Fourier sine transform of $\frac{e^{-ax}}{x}$, a > 0 . Hence find Fourier sine transform of $\frac{1}{x}$.
b.	Determine the largest Eigen value and the corresponding Eigen vector of the following matrix $\begin{bmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{bmatrix}$