Sub Code:AS303

Paper Id: 199347 Roll No:

B. TECH
(SEM-III) THEORY EXAMINATION, 2019-20
MATHEMATICS-III

Time: 3 Hours *Total Marks: 100*

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

SECTION A

1. Attempt *all* questions in brief. 2 x 10 = 20

a. Define Analytic function**.**

b. Define essential singular points with example.

c. Discuss convolution theorem on Fourier transformation.

d. Explain Z- transform of unit step function.

e. Define the coefficients of Kurtosis.

f. Define the terms expectation and variance.

g. Describe mean of the continuous random variable with probability density function f(x)= 6x(1-x) , 0≤x≤1.

h. Prove that $E^{1/2}= \mu + \frac{\delta}{2}$

i. Define order of convergence for finding out the root of a transcendental equation.

j. What do you mean by initial value problem?

SECTION B

2. Attempt any *three* of the following: 10x3=30

a. State and prove Cauchy integral formula. Also Evaluate $\oint_c \frac{z^2+1}{z^2-1}dx$ where c is the circle: $|z-1|=1$.

b. Determine the Fourier cosine transform of $\frac{1}{1+x^2}$ and hence find Fourier sine transform of $\frac{x}{1+x^2}$.

c. The first four moments about the working mean 20.4 of a distribution are1.23, 3.27, 6.54 and 245.2. Calculate β_1, β_2.

d. Using Gauss-Seidel iterative method to solve the following system of equations: 9x+4y+z=-17; x-2y-6z=14, x+6y=4.

e. Using Picard Method to approximate y when x=0.1, given that $\frac{d^2y}{dx^2} + 2x\frac{dy}{dx} + y = 0$ and y=0.5 , $\frac{dy}{dx} = 0.1$ when x=0

SECTION C

3. Attempt any *one* part of the following: 10x1=10

a. State and prove Cauchy's Residue Theorem and Evaluate $\int_c \frac{1-2z}{z(z-1)(z-2)}$ where C is The circle $|z| = 3$

b. Discuss the nature of the function $f(z) = \frac{x^3y(y-ix)}{x^6+y^2}; z \neq 0$ and f (0) =0 at the origin.

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4. Attempt any *one* part of the following: 10x1=10

a. Express the function $F(x) = \begin{cases} 1, & if\ |x| < 1 \\ 0, & if\ |x| > 1 \end{cases}$ as a Fourier integral. Hence evaluate $\int_0^\infty \frac{\sin\lambda \cos\lambda x}{\lambda} d\boldsymbol{\lambda}$.

b. Solve the diffenence equation $y_{k+2} - 3y_{k+2} - y_k = u(k)$
y(0)=y(1)=0.

5. Attempt any *one* part of the following: 10x1=10

a. State and prove Baye's theorem.

b. Three groups of children contain 3 girls and 1 boy; 2 girls and 2 boys; 1 girl and 3 boys respectively. One child is selected at random from each group. Calculate the chance of selecting 1 girl and 2 boys.

6. Attempt any *one* part of the following: 10x1=10

a. Using Newton Raphson method, find the real root of the equation 3x=cosx+1
Correct to four decimal places.

b. State and prove Rate of convergence of Regula –Falsi Method.

7. Attempt any *one* part of the following: 10x1=10

a. Solve the initial value problem $\frac{dy}{dx} = 2x + y, y(0) = 1$ with h = 0.1 on the interval [0, 0.3]. Use the fourth order Runge – Kutta method.

b. Find $f'(1.1)$ from the following table:

x:	1.0	1.2	1.4	1.6	1.8	2.0
f(x):	0.0	0.1280	0.5540	1.2960	2.4320	4.0