

Paper Id: **910196**

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

Time: 3 Hours

Total Marks: 70

Note: Attempt all sections equally and give the answers suitably.

SECTION A

1. Attempt the questions briefly. 2 x 7 = 14
- a. Define analytic function.
 - b. Define the Binomial distribution with mean and variance.
 - c. Write the normal equation for the curve $y = + bx$
 - d. Give comparison between Regula-falsi method and Newton Raphson method.
 - e. Write the relation between n^{th} divided difference and n^{th} forward difference.
 - f. What do you mean by initial value problem?
 - g. Find Z ———

SECTION B

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

- a. Show that the function $f(z) = \sqrt{|xy|}$ is not analytic at origin even though CR equations are satisfied at origin.
- b. Find the measure of skewness and kurtosis based on moments for the following distribution and draw your conclusion

Marks	5-15	15-25	25-35	35-45	45-55
No. of students	1	3	5	7	4

- c. Decompose $A = \begin{pmatrix} 5 & -2 & 1 \\ 7 & 1 & -5 \\ 3 & 7 & 4 \end{pmatrix}$ in the form LU, where L is lower triangular matrix and U is upper triangular matrix and hence solve the system of equations:

$$\begin{aligned} 5x - 2y + z &= 4 \\ 7x + y - 5z &= 8 \\ 3x + 7y + 4z &= 10. \end{aligned}$$

- d. Express the function $f(x) = \begin{cases} |x| & |x| \leq 1 \\ 1 & |x| > 1 \end{cases}$ as a Fourier Integral.
Hence evaluate ——— $d\lambda$.

OR

Find the value of $u(x, t)$ satisfying the parabolic equation $\frac{\partial u}{\partial t} = 4 \frac{\partial^2 u}{\partial x^2}$ with boundary conditions $u(0, t) = 0 = u(8, t)$ and $u(x, 0) = 4x - \frac{x^2}{2}$ at the points $x = i, i = 0, 1, 2, 3, \dots, 7$ and $t = \frac{1}{8} j : j = 0, 1, 2, \dots, 5$

- e. Given the initial value problem $y' = x - y, y(0) = 1$.
Find the numerical solution of differential equation at $x = 0.4$ with $h = 0.2$ by using Runge-Kutta method of Fourth order.

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SECTION C

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

(a) Evaluate the integration: $\int_0^\pi \frac{d\theta}{3+2\cos\theta}$

(b) State Cauchy Integral formula and hence evaluate $\oint_C \frac{\cos z^2}{(z-1)(z-2)} dz$, where C is the circle $|z| = 3$.

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

(a) Find Fourier cosine transform of — and hence find Fourier sine transform of —.

(b) Find the inverse Z-transform of F(z), where F(z) is given by

(i) $\frac{z}{(z-1)(z-2)}$ (ii) $\frac{z}{(z-1)(z-2)(z-3)}$

OR

(a) Classify the PDE $x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2} = 0$

(b) Solve $\frac{\partial^2 u}{\partial t^2} = \frac{\partial^2 u}{\partial x^2}$ with conditions

$u(0,t) = u(1,t) = 0; u(x,0) = \frac{x(1-x)}{2}$ and $u_t(x,0) = 0$, taking

$h = k = 0.1$ for $0 \leq t \leq 0.4$.

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

(a) In a partially distributed laboratory record of an analysis of a correlation data, the following result are legible:

Variance of $x = 9$

Regression equation: $8x - 10y + 66 = 0, 40x - 18y = 214$.

What were (i) the mean values of x and y . (ii) the standard deviation of y and the coefficient of correlation between x and y .

(b) Find the mean and variance of normal distribution.

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

(a) Find the real root of the equation $x^3 - 2x + 5 = 0$ by method of False position correct three decimal places.

(b) State Lagrange interpolation formula. Find the interpolating polynomial by Lagrange interpolation formula for the given data

x	5	6	9	11
y	12	13	14	16

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

(a) Apply Simpson's 3/8th rule to obtain approximate value of (i) $\int_0^1 e^{-x} dx$ (ii) $\int_0^1 (2x-x)^2 dx$ using Simpson's rule with 6 interval.

(b) Find x for which y is maximum and find the max value of y

x	1.2	1.3	1.4	1.5	1.6
y	0.9320	0.9636	0.9855	0.9975	0.9996