Printed pages: 2 **Roll No.** | | | | | | | | | | | **Sub Code: AS-303**

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B-TECH

(SEM.III) THEORY EXAMINATION 2017-18

Mathematics-III

Time: 3 Hours **[Total Marks: 100]**

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

SECTION-A

1. Attempt *all* questions in brief. **2x10 = 20**

a. Define the Z-transform.

b. Prove that $u(x,y)=e^x \cos y$, is harmonic function.

c. Prove Cauchy-Riemann equation in Polar form.

d. The first-three central moments of a distribution are 0, 2.5, 0.7. Find the value of the moment coefficient of skewness.

e. Show that order of Convergence of Bisection Method is linear i.e. 1.

f. Prove that $E=1+\Delta$

g. Differentiate between Skewness & Kurtosis.

h. Use Piccards Method to obtain y for x=0.1

Given that $\frac{dy}{dx}=3x+y^2$, y=1, when x=0

i. Fit the equation of Straight line from the following data:

x:	1	2	3	4	5
y:	14	27	40	55	68

j. Find the Third divided difference with arguments 2, 4, 9, 10 of the function $f(x)=x^3-2x$.

SECTION-B

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

a. Show that the function f(z) defined by $f(z)=\frac{x^3y^5(x+iy)}{x^6+y^{10}}, z\neq 0,\ f(0)=0$, is not analytic at origin even though it satisfies Cauchy-Riemann equations at origin.

b. In a partially destroyed Laboratory record of an analysis of correlation data, the following results are legible Varx=9 Regresion equation are-

$$8x-10y=-66$$
$$40x-18y=214$$

Find :

(I) Mean value of x and y (II) Standard Deviation of y (III) Correlation Coefficient between x & y.

c. Find the Fourier transform of $F(x)=\begin{cases}1, & |x|<a\\ 0, & |x|>a\end{cases}$.

d. Solve the following system of linear equations by Gauss Sieddel Method:
5 x + 2y + z = -12; -x + 4y + 2z = 20; 2x - 3y + 10z = 3

e. Find the cubic polynomial which takes the following values:

x	0	1	2	3
y	1	2	1	10

SECTION-C

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

a. State and prob Cauchy's Integral formula.

b. Using complex variable techniques evaluate the real integral $\int_0^{2\pi}\frac{\sin 2\theta d\theta}{5-4\cos\theta}$

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

a. The distribution of the number of road accidents per day in a city is Poisson with mean 4. Find the number of days out of 100 days when there will be
(i) no accident (ii) at least 2 accidents
(iii) at most 3 accidents (iv) between 2 and 5 accidents.

b. Assuming that half the population of a town consumes chocolates and 100 investigators each take 10 individuals to see whether they are consumers. How many investigators would be needed to report that 3 people or less were consumers?

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

a. State Lagrange's interpolation formula. Find the cubic Lagrange's interpolating polynomial from the following data:

x:	3	2	1	-1
y:	3	12	15	-21

b. Use Newton's Raphson method to solve the equation
Cos x – x e^x = 0 correct to four decimal places.

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

a. Given that $\frac{dy}{dx}=1+xy$; $y(0)=2$, Using Runge- Kutta Fouth order method, find y(0.1), y(0.2).

b. The distance covered by an athlete for the 50 metre race is given in the following table:

Time(sec.) :	0	1	2	3	4	5	6
Distance(metre):	0	2.5	8.5	15.5	24.5	36.5	50

Determine the speed of the athlete at t=5 sec.

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

a. Use finite Fourier Transformation to solve $\frac{\partial u}{\partial t}=\frac{\partial^2 u}{\partial x^2}$ with the conditions
(i) $u(0,t)=0$ **(ii)** $u(\pi,t)=0$ **(iii)** $u(x,0)=2x$ where $0<x<\pi$.

b. Using the Z-transform solve the following difference equations:

$6y_{k+2}-y_{k+1}-y_k=0$ given that $y_{(0)}=0,\ y_{(1)}=1$.