Printed pages:3 **Roll No.** ☐☐☐☐☐☐☐☐☐☐ **Sub Code: EAS-301**

Paper ID: 9 0 3 8

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) State the necessary and sufficient conditions for f(z) to be analytic.

(b) If the first four moments of a distribution about the value 5 are equal to -4, 22, -117 and 560. Determine the corresponding moments about the mean.

(c) The regression equations calculated from a given set of observation for two random variables are $x = -0.4y + 6.4$ and $y = -0.6x + 4.6$ calculate $\bar{x}, \bar{y}$.

(d) Define poisson distribution.

(e) Define the harmonic function.

(f) State Simpson's 3/8 rule.

(g) Find Z-transformation of $f(k) = \begin{cases} 1 \ , & k = 0 \\ 0, & k \neq 0 \end{cases}$

(h) Explain the false position method.

(i) If f(z) is analytic function of z show that $\left(\dfrac{\partial^2}{\partial x^2} + \dfrac{\partial^2}{\partial y^2} \right) |f(z)|^2 = 4|f'(z)|^2$.

(j) Define the Z - transform of the sequence $\{f_k\}$.

SECTION-B

2. **Attempt any three parts from this section.** **(10×3=30)**

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

$y_{k+2} + 4y_{k+1} + 3y_k = 3^k$ $given$ $y_{(0)} = 0, y_{(1)} = 1$.

b. Using Cauchy Integral formula evaluate the following integral :

$\displaystyle\int_C \dfrac{\sin \pi z^2 + \cos \pi z^2}{(z-1)(z-2)} dz$ $where$ C is $|Z| = 3$

c. Find the root of equation using Regula-Falsy Method correct up to four decimal places, $x - e^{-x} = 0$.

d. Find the rank correlation coefficient from the following data :

X	74	75	78	72	78	77	79	81	79	76	72	71
Y	47	44	40	48	49	45	46	42	42	39	46	40

e. Solve the following initial value problem

$\frac{dy}{dx} = -2xy^2$, y(0) =1

With h=0.2 on interval (0, 0.6) using fourth order Runge-Kutta method. Compare with exact solution.

SECTION-C

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

(a) Expand $\frac{(z-2)(z+2)}{(z+1)(z+4)}$ in the regions (a) $|z|<1$ (b) $1<|z|<4$.

(b) Evaluate the integral by contour integration $\int\limits_{0}^{2\pi} \frac{\cos 3\theta}{5-4\cos\theta} d\theta$.

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

(a) Find inverse Z-transformation of $\frac{z^2}{(z-1)(z-3)}$.

(b) Find the Fourier cosine transformation of $\frac{1}{1+x^2}$.

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

(a)   Solve the following system of linear equations by Gauss-Seidel iteration Method:

x + y + 54z = 110; 27x + 6y – z = 85; 6x + 15y + 2z = 72

(b) Evaluate $\int\limits_{0}^{1} \frac{dx}{1+x^2}$ using Simpson's 1/3 rule, Simpson's 3/8 rule taking h=1/4?

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

(a) Fit a least square curve $y = ax^b$ to the given data

x	1	2	3	4	5	6
y	2.98	4.26	5.21	6.1	6.8	7.5

(b) Use Newton's divided difference formula to find the interpolating polynomial and hence evaluate y(9'5) from the given data :

x	7	8	9	10
y	3	1	1	9

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

(a) A river is 80 meter wide. The depth y of the river at a distance x from one bank is   given by the following table:

x: 0   10   20   30   40   50   60   70   80

y: 0   4   7   9   12   15   14   8   3

Find the appropriate area of cross section of the river by using suitable Integration Formula.

(b) Using Newton's Raphson Method solve the equation Cos$x$-xe^x=0 correct to four decimal places.