

Paper Id: 199221Roll No.

B. TECH.
(SEM-IV) THEORY EXAMINATION 2018-19
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. Write Cauchy integral theorem for multiply connected region.
- b. Define removable singular points with example.
- c. Define the coefficients of Skewness.
- d. Write the normal equations to $y = ax + \frac{b}{x^2}$.
- e. Out of 800 families with 5 children each, how many would you expect to have 5 girls.
- f. Define Control Charts.
- g. Isolate the roots of the equation $x^3 - 4x + 1 = 0$.
- h. Differentiate between order and rate of convergence of an iterative method.
- i. Write Euler's formula for solving ordinary differential equation.
- j. Write the conditions when LU decomposition method does not work.

SECTION B**2. Attempt any three of the following: 10 x 3 = 30**

- a. Write the Laurent's expression for $f(z) = \frac{7z-2}{z^3-z^2-2z}$ in the regions.
(i) $0 < |z+1| < 1$ (ii) $1 < |z+1| < 2$ (iii) $3 < |z+1|$

- b. Using least square method, fit a second degree polynomial from the following data:

x	0	1	2	4	5	6	7	8	9
y	12.0	10.5	10.0	8.0	7.0	8.0	7.5	8.5	9.0

- c. The 9 items of a sample have the following values:
45, 47, 50, 52, 48, 47, 49, 53, 51.

Does the mean of these values differ significantly from the assumed mean 47.5?

- d. Show that the Newton-Raphson Method has second order convergence.

- e. Use fourth order Runge –Kutta method to find $y(0.2)$, Given
 $\frac{dy}{dx} = 4y^2; y(0) = 0$.

SECTION C

3. Attempt any *one* part of the following: 10 x 1 = 10

- (a) Using calculus of residue, evaluate the following integral $\int_0^{\infty} \frac{dx}{(a^2 + x^2)^2}$.
- (b) Determine the analytic function $f(z) = u + iv$, in terms of z , whose $u - v = e^x(\cos y - \sin y)$.

4. Attempt any *one* part of the following: 10 x 1 = 10

If the θ is the acute angle between the two regression lines in the case of two

- (a) variables x and y , show that $\tan \theta = \frac{1 - r^2}{r} \cdot \frac{\sigma_x \sigma_y}{\sigma_x^2 + \sigma_y^2}$ where r , σ_x , σ_y have their usual meanings. Explain the significance of the formula when $r = 0$ and $r = -1$.
- (b) Determine the constants a and b by the method of least square such that $y = ae^{bx}$ fits the following data:

x	2	4	6	8	10
y	4.077	11.084	30.128	81.897	222.62

5. Attempt any *one* part of the following: 10 x 1 = 10

- (a) The following table gives the number of accidents that took place in an industry during various days of the week. Test if accidents are uniformly distributed over the week:

Day	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Number of Accidents	14	18	12	11	15	14

- (b) Prove that Poisson distribution is the limiting case of Binomial distribution.

6. Attempt any *one* part of the following: 10 x 1 = 10

- (a) Find a real root of the equation $x \log_{10} x = 1.2$ using bisection method correct up to three decimal places.
- (b) Population of a town as given:

Years(x)	1891	1901	1911	1921	1931
Population(y)	49	60	88	99	120

Estimate the population for the year 1894.

7. Attempt any *one* part of the following: 10 x 1 = 10

- (a) Solve the system of equations using crout's method.
 $2x + 3y + z = 9$, $x + 2y + 3z = 6$, $3x + y + 2z = 8$.
- (b) Compute $\int_0^6 \frac{dx}{1+x^2}$ using Simpson's 3/8 rule.