

B TECH
(SEM III) THEORY EXAMINATION 2018-19
MATHEMATICS-III

Time: 3 Hours

Total Marks:70

Notes: Assume any Missing Data.

SECTION – A

1. Attempt **ALL** parts of the following: **7 X 2 = 14**
- The function $f(x) = e^x(\cos y + i \sin y)$ is holomorphic or not.
 - Find the residue of $\frac{z^2}{(z-1)(z-2)^2}$ at pole $z = 2$.
 - Formula of Measure of Kurtosis $\beta_2 =$
 - The first three central moments of a distribution are 0, 15, -31. Find the moment coefficient of skewness.
 - Obtain the function whose first difference is $9x^2 + 11x + 5$.
 - Find the normal equation of a curve $y = ax + bx^2$
 - Let $f(z) = u(r, \theta) + iv(r, \theta)$ be an analytic function. If $u = -r^3 \sin 3\theta$, then find v .

SECTION – B

2. Attempt any **THREE** parts of the following: **3 X 7 = 21**

- a) From the following table of values of x and y , obtain $\frac{dy}{dx}$ for $x = 1.2, 2.2, 1.6$.

$x:$	1.0	1.2	1.4	1.6	1.8	2.0	2.2
$y:$	2.7183	3.3201	4.0552	4.9530	6.0496	7.3891	9.0250

- Using Runge-Kutta method of fourth order, find $y(0.8)$ correct to 4 decimal places if $\frac{dy}{dx} = y - x^2$, $y(0.6) = 1.7379$, taking $h = 0.1$.
- Using complex integration method, evaluate $\int_0^{2\pi} \frac{\cos 2\theta}{5+4 \cos \theta} d\theta$.
- The equations of two regression lines, obtained in a correlation analysis of 60 observations are:
 $5x - 6y = 24$, $768x - 100y = 3608$. What is the correlation coefficient? Show that the ratio of coefficient of variability of x to that of y is $\frac{5}{24}$. What is the ratio of variances of x and y ?
- The pressure of the gas corresponding to various volumes V is measured, given by the following data:

$V(\text{cm}^3)$	50	60	70	90	100
$P(\text{kg cm}^{-2})$	64.7	51.3	40.5	25.9	78

SECTION – C

3. Attempt any **TWO** parts of the following: **2 X 3.5 = 07**
- Find the unique polynomial $P(x)$ of degree 2 such that: $P(1) = 1$, $P(3) = 27$, $P(4) = 64$, use Lagrange method of interpolation.
 - Using Simpson's $\frac{3}{8}$ rule on integration, evaluate $\int_0^6 \frac{1}{1+x} dx$
 - Expand $\frac{1}{z^2-3z+2}$ in the region $1 < |z| < 2$.

4. Attempt any **TWO** parts of the following:

2 X 3.5 = 07

- a) If the probability of hitting a target is 10% and 10 shots are fired independently. What is the probability that the target will be hit at least once?
 b) A die is thrown 276 times and the results of these throws are given below:

No. appeared on the die	1	2	3	4	5	6
Frequency	40	32	29	59	57	59

Test whether the die is biased or not. [Tabulated value of χ^2 at 5% level of significance for 5 degree of freedom is 11.09]

- c) By Residue method, find the inverse Z-transform of $\frac{z}{z^2+7z+10}$

5. Attempt any **TWO** parts of the following:

2 X 3.5 = 07

- a) The following data regarding the heights (y) and weights (x) of 100 college students are given:

$$\sum x = 15000, \sum x^2 = 2272500, \sum y = 6800, \sum y^2 = 463025, \sum xy = 1022250$$

- b) Solve $x^3 - 5x + 3 = 0$ by using Regula-Falsi method correct up to four decimal places.
 c) From the table, estimate the number of students who obtained marks between 40 and 45.

Marks:	30-40	40-50	50-60	60-70	70-80
No. of Students:	31	42	51	35	31

6. Attempt any **TWO** parts of the following:

2 X 3.5 = 07

- a) Find the residue of $f(z) = \frac{z^3}{(z-1)^4(z+2)(z-3)}$ at its pole and hence evaluate $\int_C f(z) dz$, where C is the circle $|z| = 5/2$

- b) Determine the largest Eigen value and corresponding eigen vector of the matrix

$$A = \begin{bmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{bmatrix} \text{ till three approximation.}$$

- c) Verify Cauchy theorem by integrating e^{iz} along the boundary of the triangle with the vertices at the points $1 + i, -1 + i$ and $-1 - i$.

7. Attempt any **TWO** parts of the following:

2 X 3.5 = 07

- a) Use Picard's method to obtain y for $x = 0.2$. Given: $\frac{dy}{dx} = x - y$ with initial condition $y = 1$ when $x = 0$ correct up to four decimal places.

- b) In a normal distribution, 31% of the items are under 45 and 8% are over 64. Find the mean and standard deviation of the distribution. It is given that if $f(t) = \frac{1}{\sqrt{2\pi}} \int_0^t e^{-\frac{1}{2}x^2} dx$ then $f(0.5) = 0.19, f(1.4) = 0.42$

- c) Prove that $hD = -\log(1 - \nabla) = \sin h^{-1}(\mu\delta)$