

--	--	--	--	--	--	--	--	--	--

B TECH
(SEM-IV) THEORY EXAMINATION, 2018-2019
MATHEMATICS-III

Time: 3 Hours

Total Marks: 70

Note 1. Attempt the questions in any order you wish in the hall seatably.

SECTION

1. Attempt the questions brief.

2 x 7 = 14

- Write the statement of Cauchy's Integral formula
- Find the residue at the pole of the function $(z) = \frac{z^{\infty}}{(z-2)^{\infty}}$
- Write the normal equations of the curve $= a + \frac{b}{x^{\infty}} + \frac{c}{x^{\infty}}$
- A die is tossed thrice .A success is getting 4 or 5 on a toss.Find the mean and variance of the number of successes.
- Show that $\mu^2 = 1 + \frac{1}{4}\delta^2$.
- Using Euler's method solves the differential equation in three steps: $\frac{dy}{dx} = x + y^2, y(1) = 2$ and $h = 0.2$.
- Find the Z-transform of $\{-2, -1, 0, 2, 4, 5, 10, 15\}$.

SECTION B

2. Attempt any three of the following:

7 x 3 = 21

- State and prove Taylor's theorem.
- Solve the following system by Jacobi's method:

$$\begin{aligned} x + y + 54z &= 110 \\ 27x + 6y - z &= 85 \\ 6x + 15y + 2z &= 72 \end{aligned}$$
- Find the root of the equation $x e^x = \cos x$ by the Regula Falsi method , up to four decimal places.
- Out of 1000 families with four children each, how many families would be expected to have: (i) 2 boys and 2 girls; (ii) at least one boy; (iii) no girl (iv) at most two girls ?
- Solve the difference equation $y_{k+3} - 3y_{k+2} + 3y_{k+1} - y_k = U(k)$ where $y_0 = y_1 = y_2 = 0$ by using Z-transform.

SECTION C

3. Attempt any one part of the following:

7 x 1 = 7

- Prove that $u = x^2 - y^2 - 2xy - 2x + 3y$ is harmonic. Find a function v such that $f(z) = u + iv$ is analytic .Also express $f(z)$ in terms of z .
- Expand $f(z) = \frac{1}{z^{\infty} - 3z + 2}$ in the region (i) $|z| < 1$ (ii) $1 < |z| < 2$ (iii) $|z| > 2$

4. Attempt any one part of the following:

7 x 1 = 7

- The following regression equations and variances are as follows: $7x - 16y + 9 = 0, 5y - 4x - 3 = 0$, variance of x = 9. Find the value of (i) mean values of x and y (ii) the coefficient of correlation between x and y, (iii) the standard deviation of y.

- Fit a curve $y = ae^{bx}$ to the following data :

x	1	2	3	4	5	6
y	7.209	5.265	3.846	2.809	2.052	1.499

5. Attempt any one part of the following:

7 x 1 = 7

(a) Find missing term, given that

X	0	5	10	15	20	25
Y	6	10	17	31

(b) Find the values of F(2),F(8) and F(15) from the following table:

x	4	5	7	10	11	13
F(x)	48	100	294	900	1210	2028

6. Attempt any one part of the following:

7 x 1 = 7

(a) Use the Runge – Kutta method of fourth order to find $y(0.1)$ with $h=0.05$ for $\frac{dy}{dx} = \sqrt{x+y}$, where $y(0) = 1$.

(b) State and prove Trapezoidal rule for numerical integration.

7. Attempt any one part of the following:

7 x 1 = 7

(a) Find the Fourier sine transform of $F(x) = \frac{e^{-ax}}{x}$. Hence find the Fourier sine transform of $(x) = \frac{1}{x}$.(b) Find $Z^{-1} \left(\frac{z^2}{(z-5)(z-6)^2} \right)$.

downloaded from
StudentSuvidha.com