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B. TECH.

(SEM IV) THEORY EXAMINATION 2018-19

ENGINEERING MATHEMATICS - III

Time: 3 Hours | *Total Marks: 70*

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

SECTION A

1. Attempt *all* questions in brief. **2 x 7 = 14**

a) State Cauchy integral theorem.

b) Find the missing term in the following table:

x	0	5	10	15	20	25
y	6	10	--	17	24	31

c) Define binomial distribution and write their mean and standard distributions.

d) Write Simpson's 3/8 rule.

e) Define average operator and central operator and find relationship between them.

f) Define condition number.

g) Find the inverse Z-transform of $\left\{\frac{3}{z-1}\right\}$

SECTION B

2. Attempt any *three* of the following: **7 x 3 = 21**

a) Prove that $\frac{f(z)-f(0)}{z} \to 0$ as $z \to 0$ along any radius vector but not as $z \to 0$ in any manner and also that f(z) is not analytic at z = 0.

b) Using method of Least squares, find the curve y = a x + b x^2 that best fit the following data:

x	1	2	3	4	5
y	1.8	5.1	8.9	14.1	19.8

c) Using Euler's method solve $\frac{dy}{dx} = \log(x+y)$ with the initial condition that y= 2 when x=0. Find y for x = 1.2 and x = 1.4.

d) Use Runge-Kutta method of fourth order ,solve $\frac{dy}{dx} = \frac{y^2-x^2}{y^2+x^2}$ with y(0) = 1, at x = 0.2 and 0.4.

e) Find the Fourier sine transform of $\frac{e^{-ax}}{x}$, a> 0 . Hence find Fourier sine transform of $\frac{1}{x}$.

SECTION C

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

a) Evaluate $\int \frac{z^2-2z}{(z+1)^2(z^2+4)}dz$, where C is the circle |z| = 10.

b) Evaluate $\int \frac{e^z}{(z-1)(z-4)}$ dz where Cis the circle |z| = 2 by using Cauchy's integral formula.

4. Attempt any *one* part of the following **7×1=7**

a) Find the Fourier transform of e^{-ax^2} , where a > 0.

b) Find the Z-transform of $\cosh\left(\frac{k\pi}{2}+\alpha\right)$.

5. Attempt any one part of the following: 7×1=7

a) In a certain factory turning out razor blades, there is a small chance of 0.002 for any blade to be defective. The blades are supplied in packets of 10. Use appropriate and suitable distribution to calculate the approximate number of packets containing no defective, one defective and two defective blades respectively in a consignment of 50000 packets.

b) A sample of 100 dry battery cells tested to find the length of life produced the following results $\bar{x}$ = 10hours, σ = 3 hours. Assuming the data to be normally distributed, what percentage of battery cells are expected to have life

i. more than 15 hours

ii. between 10 and 14 hours.

6. Attempt any one of the following 7×1=7

a) By using Newton-Raphson method, find the root of x^4-x-10= 0, which is near to x=2 correct to three places of decimal.

b) Using Lagrange's interpolation formula, find the values of y corresponding to x =10 from the following table:

x	5	6	9	11
y	12	13	14	16

7. Attempt any one of the following 7×1=7

a) Solve by Crout's method, the following system of equation: $X + Y + Z = 3$, $2X - Y + 3Z = 16$, $3X + Y - Z = -3$.

b) Using Picard's method find a solution of $\frac{dy}{dx} = 1 + xy$ upto third approximation, when $x_0=0$, $y_0=0$