Model Paper-1
MCA-2ND Sem.
Computer Based Numerical & Statistical Techniques

Paper Code-RCA-201   **Total Marks-70**
All Sections are Compulsory-

Section A

1. Attempt All-   **2X7=14**

(a)Perform the the following floating point calculations:
   (i)   .9432 E – 4 from .5452 E – 3
   (ii)   (.4546 E 3) + (.5454 E 8)

(b)The geometric mean of the regression coefficients is equal to………………..

(c)Define Normalization.

(d)The order of Convergence of Secant Method is………………………

(e)Write down the Stirling Formula.

(f)-Write down the formula for test-statistic for testing $H_0: \mu = \mu_0$ when sample size n is small?

(g)Define Interpolation and Extrapolation.

Section B

2.Attempt any three-   **7X3=21**

(a)Use Gauss' forward formula to find a polynomial of degree four which takes the following values of the function f(x):
x: 1   2   3   4   5
f(x): 1   – 1   1   – 1   1

(b)Prove that the rate of convergence of Regula Falsi method is 1.62

(c) Obtain the cubic spline for the following data:

x: 0   1   2   3
y: 2 − 6 − 8 2

(d)The equations of two regression lines, obtained in a correlation analysis of 60 observations are:
5x = 6y + 24 and 1000y = 768x − 3608.
What is the correlation coefficient? Show that the ratio of coefficient of variability of x to that of y is 5/24. What is the ratio of variances of x and y?
(e) Compute root of the equation $x^2e^{-x/2}=1$ in the interval [0, 2] using secant method. The root should be correct to three decimal places.

Section C

3.Attempt Any One Part of the following-   **7X1=7**
(a)Evaluate $\sqrt{12}$ to four decimal places by Newton's iterative method.
(b)Fit a second degree parabola in the following data:

x: 0.0 1.0   2.0   3.0   4.0
y: 1.0 4.0 10.0 17.0   30.0

4. Attempt Any One Part of the following-   **7X1=7**
(a)A die is thrown 90 times with the following results:

Face:	1	2	3	4	5	6	Total
Frequency:	10	12	16	14	18	20	90

Use χ^2-test to test whether these data are consistent with the hypothesis that die is unbiased.
Given χ^2 0.05 = 11.07 for 5 degrees of freedom.

(b) Given $dy/dx=\log_{10}(x+y)$ with initial condition that y=1 when x=0.Find y for x = 0.2 and x=0.5 using Euler's modified formula.

5. Attempt Any One Part of the following-   **7X1=7**
(a)The velocities of a car running on a straight road at intervals of 2 minutes are given below:

Time (in minutes): 0 2   4   6 8   10 12
Velocity (in km/hr): 0 22 30 27 18   7 0

Apply Simpson's rule to find the distance covered by the car.

(b)

Write short note on-
(I)   T-test
(II)   F-test
(III)   Hermite Interpolation
(IV)   Moving Average
(V)   Frequency Chart

6. Attempt Any One Part of the following-   7X1=7

(a)Use Runge-Kutta Method of Fourth Order to find the numerical solution at x = 1.4 for

$dy/dx = y^2 + x^2$, y(1) = 0. Assume step size h = 0.2.

(b) Solve the following system of equation by using Gauss-elimination method with pivoting.

2x+y+4z=12, 8x-3y+2z=23 and 4x+11y-z =33

7. Attempt Any One Part of the following-   7X1=7

(a)Solve the following system of equation using Gauss-Seidal iteration method:

2x+10y+z=51
10x+y+2z=44
x+2y+10z=61

(b)Assuming 5-yearly moving averages, calculate trend values from the data below and draw approximately on answer sheet:

Years	1971	1972	1973	1974	1975	1976	1977
Production ('000 tons')	105	107	109	112	114	116	118

Years	1978	1979	1980	1981	1982	1983
Production ('000 tons')	121	123	124	125	127	129