Or

Discuss the order and rate of convergence of Newton-Raphson method. Find an iterative formula to find the reciprocal of a given number N and hence evaluate $\frac{1}{24}$.

12. Using Runge-Kutta method of order 4, find y for x = 0.1, 0.2, 0.3 given that $\frac{dy}{dx} = xy + y^2$, $y(0) = 1$. Continue the solution at x = 0.4 using Milne-Simpson's method. **12**

Or

Using the Chebyshev polynomials, obtain the least squares approximation of second degree for $f(x) = x^4$ on [–1, 1].

13. Write a note on Chi-square test and its applications. The following table shows the distribution of digits in numbers chosen at random from a telephone directory :

Subject Code—387

M.C.A. (Third Year) EXAMINATION

(Five Year Integrated Course)

(Main & Re-appear for Batch 2009 Onwards)

MATHEMATICS-III

MCA-305

Computer Oriented Numerical and Statistical Methods Using C

Time : 3 *Hours* *Maximum Marks :* 70

Section A

Note : Attempt any *Seven* questions. **7×5=35**

1. If $u = 10x^3y^2z^2$ and errors in x, y, z are 0.03, 0.01, 0.02 at x = 3, y = 1, z = 2. Calculate absolute error and percentage error in evaluating u.

2. Find the positive root of the equation $x^3 - x - 4 = 0$ by bisection method.

3. Find the quadratic factor of $x^4 - 3x^3 + 20x^2 + 44x + 54 = 0$ close to $x^2 + 2x + 2$ with $p_0 = 2$, $q_0 = 2$ by using Bairstow's method.

4. Using Gauss elimination method, solve the following system of equations $2x + y + z = 10$, $3x + 2y + 3z = 18$, $x + 4y + 9z = 16$.

5. Solve the following system of equations by Gauss-Seidel method :

$10x + y + 2z = 44, 2x + 10y + z = 51$

$x + 2y + 10z = 61$

6. The following table gives the velocity 'v' of a body during the time t specified. Find its acceleration at t = 1.1.

t :	1.0	1.1	1.2	1.3	1.4
v :	43.1	47.7	52.1	56.4	60.8

7. By Simpson's rule, evaluate $\int_1^{10} x^2 \, dx$ by taking 10 ordinates.

8. Obtain the least square polynomial approximation of degree one for $f(x) = x^{\frac{1}{2}}$ on $[0, 1]$.

9. Discuss four main components of time series.

10. What are the main steps for testing of hypothesis ?

Section B

Note : Attempt all the questions.

11. Explain the method to find out the order and rate of convergence of Regula-Falsi method. Using this method, find a real root of the equation $x^3 - x^2 - 2 = 0$ correct to three decimal places. **12**

Varieties			
A	**B**	**C**	**D**
8	12	18	13
10	11	12	9
12	9	16	12
8	14	6	16
7	4	8	15

Prepare analysis of variance table and test if the varieties differ significantly among themselves. (Tabulated value of $F_{0.05}$ for (3, 16) degree of freedom at 5% level of significance is 3.24).

Digits	Frequency
0	1026
1	1107
2	997
3	966
4	1075
5	933
6	1107
7	972
8	964
9	853

Test at 5% level whether the digits may be taken to occur equally frequently in the directory (Tabulated value of χ^2 for 4 degrees of freedom at 5% level of significance is 16.92.

11

Or

Define analysis of variance. Discuss the technique of analysis of variance for one-way classification. The following table given the yields on 20 sample plots under four varieties of seeds :