Roll No. .....

Subject Code—6715

M.C.A. (Third Year) EXAMINATION

(5 Years Integrated Course)

MCA-305

MATHEMATICS III

Computer Oriented Numerical and Statistical Method Using C

Time : 3 *Hours* *Maximum Marks* : 100

Note : Attempt any *Five* questions. All questions carry equal marks.

1. (a) Represent the number 0·00004917 in normalized floating point mode. How is the number stored in memory location ?

   (b) (i) Add 0·511 E-3 and 0·0171 E-4.

   (ii) Subtract 0·8317 E-4 from 0·6568 E-3.

(c) If :

$x = 0{\cdot}5665$ E1

$y = 0{\cdot}5556$ E–1

$z = 0{\cdot}5644$ E1

prove that :

$$(x+y)-z \neq (x-z)+y.$$

(d) Find the percentage error in the sum $\left(\sqrt{11}+\sqrt{19}+\sqrt{2}+\sqrt{8}\right)$ when these numbers are approximated to four significant digits.

2. (a) Find the positive root of the equation $x \log_{10} x - 1{\cdot}2 = 0$ by bisection method.

(b) Using Newton-Raphson method, find an iterative formula to find the pth root of a given number N and hence evaluate the cube root of 10.

3. (a) Solve the following equation by Gauss Seidal method :

$$10x + 2y + z = 9$$
$$2x + 20y - 2z = -44$$
$$-2x + 3y + 10z = 22$$

(b) Use Runge-Kutta method of order 4 to compute $y(0{\cdot}2)$ and $y(0{\cdot}4)$ if $\frac{dy}{dx} = \frac{x^2 + y^2}{10}$, $h = 0{\cdot}1$ and $y(0) = 1$.

4. (a) Using Milne's predictor-corrector method obtain the solution of the equation :

$$\frac{dy}{dx} = x - y^2$$

at $x = 0{\cdot}8$ given that $y(0) = 0{\cdot}0000$, $y(0{\cdot}2) = 0{\cdot}0200$, $y(0{\cdot}4) = 0{\cdot}0795$, $y(0{\cdot}6) = 0{\cdot}1762$.

(b) Find the first and second derivative of the function tabulated below at $x = 0{\cdot}6$:

x	y
0·4	1·5836
0·5	1·7974
0·6	2·0442
0·7	2·3275
0·8	2·6511

5. (a) Compute the value of $\int_0^{\pi} \sin x \, dx$ by Trapezoidal rule and Simpson's rule dividing the range into ten equal parts.

(b) Find the cubic polynomial from the following data by using Lagrange's interpolation formula :

x	$f(x)$
0	2
1	3
2	12
5	147

6. (a) Find least square polynomial approximation of degree two to the data :

x	$f(x)$
0	− 4
1	− 1
2	4
3	11
4	20

Also compute the least square error.

(b) Explain conditions for applying χ^2 test and its uses.

In an experiment on immunization of cattle from tuberculosis, the following results were obtained :

	Affected	Not Affected
Inoculated	12	26
Not Inoculated	16	6

Calculate χ^2 and discuss the effect of vaccine in controlling susceptibility to tuberculosis (5% value of χ^2 for one degree of freedom = 3·84).

7. Discuss the assumptions and technique of analysis of variance.

A common test was given to a number of students taken at random from fifth class of each of the four schools. The results are given below. Make an analysis of variance of data :

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

8. Define Time Series Analysis and its various components. Explain the methods, to determine the seasonal variations. Calculate the reasonal indices for the following data related to quarterly sales using simple average method :

Quarterly Sales

	Q_1	Q_2	Q_3	Q_4
2004	200	205	210	220
2005	230	215	205	230
2006	220	220	215	240
2007	230	230	220	230