Roll No. .....

Subject Code—2017

M.C.A. (Third Year) EXAMINATION

(Five Year Integrated Course)

MATHEMATICS–III

MCA-305

Computer Oriented Numerical and Statistical Methods Using (C)

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

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

1. (a) Describe the following : 6

   (i) Normalized floating representation

   (ii) Mentissa and exponent port.

   (b) (i) Multiply the numbers 0·200000E-1 and 0·400000E-2.

(ii) Multiply the numbers 0·6644E15 and 0·2311E13.

(iii) Divide the number 0·8888E-S by 0·2000E-03. 6

(c) Define absolute, relative and percentage errors. If an approximate value of π is given by $X_1 = 3{\cdot}1428571$ and its true value is $X = 3{\cdot}1415926$, find the absolute and relative errors. 8

2. (a) Solve $x^3 - 9x + 1 = 0$, by the method of false position. 10

(b) Solve $x^4 - 5x^3 + 20x^2 - 40x + 60 = 0$, given that all the roots of $f(x) = 0$ are complex, by using Lin-Bairstow method. 10

3. (a) Apply Gauss elimination method to solve the equations : 10

$$x + 4y - z = -5;$$

$$x + y - 6z = -12;$$

$$3x - y - z = 4.$$

(b) Employ Taylor's series method to obtain approximate value of y at $x = 0{\cdot}2$ for the differential equation : 10

$$\frac{dy}{dx} = 2y - 3e^x,\ y(0) = 0$$

4. (a) Given $\frac{dy}{dx} = x^2(1 + y)$ and $y(1) = 1$, $y(1{\cdot}1) = 1{\cdot}233$, $y(1{\cdot}2) = 1{\cdot}548$, $y(1{\cdot}3) = 1{\cdot}979$, evaluate $y(1{\cdot}4)$ by Adams-Bashforth method. 10

(b) Find the first and second derivatives of the function tabulated below, at the point $x = 1{\cdot}0$: 10

x	:	1·0	1·2	1·4	1·6	1·8	2·0
$f(x)$	:	0	0·128	0·544	1·296	2·432	4·00

5. (a) Use trapezoidal rule to evaluate $\int_0^1 x^3\,dx$, considering five sub-intervals. 10

(b) Find the cubic polynomial which takes the following values : 10

x	:	0	1	2	3
$f(x)$	:	1	2	1	10

Hence, or otherwise evaluate $f(4)$.

6. (a) Use Lagrange's interpolation formula to find the value of y when $x = 10$ form the following : 10

x	:	5	6	9	11
y	:	12	13	14	16

(b) Fit a linear law conecting x and y to the following data :

x	:	50	70	100	120
y	:	12	15	21	35

Hence compute y when $x = 150$. 10

7. (a) The mean of two random samples of sizes 9 and 7 are 196·42 and 198·82 respectively. The sum of the squares of the deviation from the mean are 26·94 and 18·73 respectively. Can the sample be considered to have been drawn from the same normal population ?
(Given that $t_{0.05}$ at d.f. 14 is 2·15) 10

(b) A set of 5 coins is tossed 3200 times and the number of heads appearing each time is noted. The results are :

No. of Heads :	0	1	2	3	4	5
Frequency :	80	570	1100	900	500	50

Test the hypothesis that coins are unbiased.

(Given that, for $\nu = 5$, $\chi^2_{0.05} = 11{\cdot}07$).

10

8. (a) Explain what do you understand by Analysis of Variance. State the basic assumptions in an analysis of variance. **6**

(b) Define a time series. Mention its important components with examples. **6**

(c) Explain the method of curve fitting by principal of least squares as the methods for measurement of trends. **8**