Roll No. .....

Subject Code—676-X

M.C.A. (Third Year) EXAMINATION

(5 Years Integrated Course)

(Re-appear)

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) Using normalized floating point representations, prove with suitable examples that the following laws are not always valid :

(i) $(a + b) - c = (a - c) + b$

(ii) $a(b - c) = ab - ac$

(b) Define absolute, relative and percentage errors. Round off the numbers 865250 and 37·46235 to four significant figures and compute these three errors.

2. (a) Find a real sort of the equation $x^3 - 2x - 5 = 0$ by the method of false position, correct to three decimal places.

(b) Discuss convergence of Newton-Raphson method. Using this method, find $\sqrt{28}$, correct to four decimal places.

3. (a) Solve the following system by Gauss-Seidal iteration method :

$$10x - 5y - 2z = 3$$
$$4x - 10y + 3z = -3$$
$$x + 6y + 10z = -3$$

(b) Apply Runge-Kutta method of order four to find an approximate value of y for $x = 0{\cdot}2$ in steps of $0{\cdot}1$, if :

$\frac{dy}{dx} = x + y^2$, given that $y = 1$ when $x = 0$.

4. (a) Solve numerically $\frac{dy}{dx} = xy + y^2$, $y(0) = 1$, using Milne's method to get $y(0{\cdot}4)$; use Taylor series to get the values of $y(0{\cdot}1)$, $y(0{\cdot}2)$ and $y(0{\cdot}3)$

(b) Find the first order derivative of the function tabulated below, at $x = 0$ and $x = 20$:

x	0	5	10	15	20
$f(x)$	0	3	14	69	228

5. (a) Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by using (i) Trapezoidal rule, (ii) Simpson's $\frac{1}{3}$rd rule, and (iii) Simpson's $\frac{3}{8}$ rule and compare the result with its actual value.

(b) From the table, find y at $x = 43$:

x	40	50	60	70	80	90
y	184	204	226	250	276	304

Also express y in terms of x.

6. (a) Using Lagrange's inverse interpolation formula find the value of x when $y(x) = 19$, given :

x	0	1	2
y	0	1	20

(b) The following table gives the values of x and $y(x)$, using Stirling formula find $y(1{\cdot}12)$:

x	1·0	1·05	1·10	1·15	1·20	1·25	1·30
y	1·0000	1·0242	1·048	1·0714	1·0944	1·117	1·1392

7. (a) Fit a second degree polynomial to the data :

x	3	4	5	6	7
y	6	9	10	11	12

(b) The nine items of a sample has the following values :

45, 47, 50, 52, 48, 47, 49, 53, 51

Does the mean of the nine items differ significantly from the assumed population mean of 47·5 ? (It is given that t for 8 d.f. at 5% level of significance = 2·31).

8. (a) Define analysis of variance. The following table gives the number of refrigerators sold by 4 salesmen in three months May, June and July :

	Salesmen			
Months	A	B	C	D
May	50	40	48	39
June	46	48	50	45
July	39	44	40	39

Is there a significant difference in the sale made by the four salesmen ? Is there a significant difference in the sales made during different months ?

(Given : $F_{tab}(3, 6)$ at 5% level of significance = 4·76

$F_{tab}(2, 6)$ at 5% level of significance = 5·14)

(b) Discuss utility of time series analysis. Also explain the components of time series.