June–2008

Roll No. .....

Subject Code—9691-X

M.C.A. (Third Year) EXAMINATION

(5 Years 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) Explain the types of error that may occurs in any numerical computation.

(b) Find the absolute error and the relative error in the product of 432·8 and 0·12584 using four digit mantissa.

(c) Describe floating point representation of numbers.

2. (a) Use the method of false position to find the fourth root of 32 correct to three decimal point.

(b) Using Newton-Raphson method find the smallest positive root of $x^3 - 5x + 3 = 0$.

3. (a) Apply Gauss-Seidal iteration method to solve the system of equations :

$$2x + 10y + z = 13$$

$$2x + 2y + 10z = 14$$

$$10x + y + z = 12$$

Perform three iterations only.

(b) Using Runge-Kutta methods, solve :

$$\frac{dy}{dx} = \frac{1}{x+y}$$

for $x = 0{\cdot}5$ to 2 with the increment $h = 0{\cdot}5$, if $y_0 = 1$, $x_0 = 0$.

4. (a) Find first and second derivative of y at $x = 0$ from the following data :

x :	0	1	2	3	4	5
y :	4	8	15	7	6	2

(b) Using three points Gaussian quadrature formula evaluate $\int_0^1 \frac{dx}{1+x}$.

5. (a) Find value of y at $x = 218$ and 410 from the given data :

x :	100	150	200	250	300	350	400
y :	10	13	15	16	18	19	21

(b) Fit a second degree parabola to the following data :

x	y
1·0	1·1
1·5	1·3
2·0	1·6
2·5	2·0
3·0	2·7
3·5	3·4
4·0	4·1

6. (a) Evaluate

$$\int_0^6 \frac{dx}{1+x^2}$$

by using (i) Trapezoidal rule,. (ii) Simpson's 1/3 rule, (iii) Simpson's 3/8 rule and compare the result with its actual value.

(b) Find x when $f(x) = 13$, given that :

x :	44	45	46	47
$f(x)$:	13·40	13·16	12·93	12·68

7. (a) Explain the following ;

(i) Test for number of successes

(ii) Test for proportion of successes

(iii) Test for difference between proportions and, if a machine produced 20 defective articles in a batch of 400 which after overhauling produced 10 defectives in a batch of 300, show that machine has not improved after overhauling.

(b) The life time of electric bulbs for a random sample of 10 from a large consignment gave the following data :

Item	Life (in 000 hrs)
1	4·2
2	4·6
3	3·9
4	4·1
5	5·2
6	3·8
7	3·9
8	4·3
9	4·4
10	5·6

Can we accept the hypothesis that the average life time of bulbs is 4000 hours. ($v = 9$, $t_{0·05} = 2·262$)

8. (a) Two independent samples of 8 and 7 items gave the following values :

Sample A : 9 11 13 11 15 9 12 14

Sample B : 10 12 10 14 9 8 10

Examine whether the difference between the means of the two samples is significant at 5% level ?

($v = 13$, $t_{0·05} = 2·16$)

(b) Perform a two-way ANOVA on the data given :

Plots of Land	Treatment A	B	C	D
I	38	40	41	39
II	45	42	49	36
III	40	38	42	42

For (3, 6) d.f. $F_{(0\cdot05)} = 4\cdot76$ and for (2, 6) d.f. $F_{(0\cdot05)} = 5\cdot14$.