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MCA/D-12

COMPUTER ORIENTED NUMERICAL AND STATISTICAL METHODS

Paper-MCA-105

Time allowed: 3 hours Maximum marks: 80

Note: Attempt five questions in all. Question no. 1 is compulsory. Select one question From each unit. Non-programmable calculator can be used.

Compulsory Question

1. (a) Give the names of various types of errors.
(b) Explain the difference between Algebraic and Transcendental equations.
(c) How Runge-Kutta method is superior than Taylor's series method?
(d) Define numerical Integration with examples.
(e) Explain the difference between Interpolation and Intrapolation with examples.
(f) Write the normal equation of a parabola of second degree.
(g) What do you mean by "ANOVA"?
(h) Write the components of a Time series.

Unit-I

2. (a) If a = 0.5665E1, b= 0.5556E1, c= 0.5644E1, show that (a+b) –c = (a-c) +b. 7
(b) Discuss Absolute, Relative and percentage errors with suitable examples. 7

3. (a) Find ($\sqrt{12}$) by applying Newton-Raphson method upto three decimal places. 7
(b) Show that the rate of convergence of Regula-Falsi method is 1.62. 7

Unit-II

4. (a) Solve the following system of equations by Gauss-Seidal iteration method (iterate upto three times):

$6x + 15y + 2z = 72$
$27x + 6y - z = 85$
$x + y + 54z = 110.$ 7

(b) Use Taylor's series to find the solution of differential equation

$x \frac{dy}{dx} = (x - y)$; y (z) = 2 at x = 2.1,

Correct to five places of decimal. 7

5. (a) Evaluate $\int_0^1 \frac{dx}{(1+x2)}$ by using Simpson's 1/3rd rule and 3/8 rule. Hence obtain the value of π

In each case. 7

(b) Find the first derivative of F(x) at x = 0.4 from the following table:

x :	0.1	0.2	0.3	0.4
F(x) :	1.10517	1.22140	1.34986	1.49182

7

Unit-III

6. (a) Find the third divided difference with argument 2, 4, 9,10 of the function $F(x) = x^3 - 2x$. 7

(b) The following table is given:

x: 0 1 2 5

F(x) : 2 3 12 147

What is the form of F(x)? 7

7. (a) Solve that the line of best fit to the following data is given by y = -0.5x = 8.

x : 6 7 7 8 8 8 9 9 10

y : 5 5 4 5 4 3 4 3 3 7

(b) Define Chebyshev polynomial.

Unit-IV

8. (a) The following figure show the distribution of digits in numbers chosen at random From a telephone directory:

Digits :	0	1	2	3	4	5
Frequency :	1026	1107	997	966	1075	933
Digits :	6	7	8	9	Total	
Frequency :	1107	972	964	853	10,000	

Test whether the digits may be taken to occur equally frequently in the directory.

(The tabulated $\lambda^{\sim}_{0.5}$ for 9 d.b. = 16.979) 6

(b) What is Test of significance? Discuss it. 7

9. (a) State the component of Time series. 7

(b) What is "Analysis of variance" and where is it used? Discuss it. 7