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BCA/M-16 **19003**

COMPUTER ORIENTED NUMERICAL AND STATISTICAL METHODS

Paper : BCA-103

Time : Three Hours] [Maximum Marks : 80

Note : Attempt *five* questions in all. Question No. 1 is compulsory. In addition, attempt *one* question from each unit.

Compulsory Question

1. (a) Explain the various types of errors that occur while performing numerical computations with the help of examples. 4

(b) Discuss pitfalls in differentiation. 4

(c) Define dispersion and discuss its various measures. 4

(d) Prove that the co-efficient of correlation is independent of the change of origin and scale. 4

UNIT–I

2. (a) Find the real root of the equation $xe^x - 3 = 0$ by Regula Falsi method correct up to three decimal points. 8

(b) Find real root of the equation $2x - 5 = 3 \sin x$ by Newton-Raphson method correct to three decimal digits. 8

3. (a) Solve the following equation by Gauss-elimination Method

$$4x_1 + x_2 + 3x_3 = 11$$
$$3x_1 + 4x_2 + 2x_3 = 11$$
$$2x_1 + 3x_2 + x_3 = 7$$ 8

(b) Solve $\frac{dy}{dx} = x + y$ with initial condition $y = 1$ at $x = 0$. Find y for $x = 1$ using Euler's method. 8

UNIT–II

4. (a) Given

x :	300	304	305	307
$\log_{10} x$:	2.4771	2.4829	2.4843	2.4871

Find $\log_{10} 310$ by Lagrange's formula. 8

(b) Find the power series of $\cos x$ at $x_0 = 0$ by Taylor's series. 8

5. Discuss various pitfalls in numerical differentiation. Find the values of $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at $x = 10.5$ from the following data :

x :	10	11	12	13	14
y :	15	12.8	10.6	8.5	6.4

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UNIT–III

6. (a) What are the characteristics of normal distribution ? 8

(b) If the mean of Poisson distribution is 2, find the probability for 1, 2 and 3 successes respectively, Given $e^{-2} = 0.1353$

7. (a) Find the Geometric Mean and Harmonic Mean of the following numbers : 3, 5, 6, 6, 7, 10, 12 8

(b) Find the mode of the following frequency distribution using the method of grouping :

Marks :	5	10	15	20	25	30	35	40	45	50
No. of students :	20	43	75	67	72	45	39	9	8	6

8

UNIT–IV

8. (a) The equations of two lines of regression are $3x + 12y = 19$, $9x + 3y = 46$. Find (i) Mean of x and mean of y (ii) Regression coefficients. (iii) Coefficient of correlation. http://www.kuonline.in 10

(b) Prove that regression coefficients are independent of the change of origin but not of change of scale. 6

9. Write a normal equation of the straight line and fit a second degree parabola to the following data, taking x as independent variable :

x :	1	2	3	4	5	6	7	8	9
y :	2	6	7	8	10	11	11	10	9

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