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(FOR THE CANDIDATES ADMITTED DURING THE ACADEMIC YEAR 2023 ONLY)

23UBC1A1

REG.NO. :

N.G.M.COLLEGE (AUTONOMOUS) : POLLACHI

END-OF-SEMESTER EXAMINATIONS: NOVEMBER-2023

COURSE NAME : B.C.A **MAXIMUM MARKS: 75**

SEMESTER : I **TIME : 3 HOURS**

PART – III

MATHEMATICS- I

COMPUTER ORIENTED NUMERICAL AND STATISTICAL METHODS

SECTION – A (10 X 1 = 10 MARKS)

ANSWER THE FOLLOWING QUESTIONS. K1

MULTIPLE CHOICE QUESTIONS.

1. Which of the following is true?
   a) $\Delta x^r = rx^{r-1}$ b) $\Delta^{(r)} = rx^{(r-1)}$ c) $\Delta^n e^x = e^x$ d) $\Delta \sin x = \cos x$
2. If an approximate value of the root of the equation $x^x = 1000$ is 4.5, a better approximation of the root got by Newton- Raphson method is_____.
   a) 4.44 b) 4.56 c) 5.17 d) None of the above.
3. The error in the trapezoidal rule is of the order_____.
   a) h^3 b) h c) h^2 d) None of the above.
4. If the equation $y = ax^b$ can be written in the linear form y = A+BX, what are Y, X, A, B?
   a) Y = logy, A = loga, B=b and X = logx
   b) Y = y, A = a, B=b and X = x
   c) Y = y, A = a, B=logb and X = logx
   d) Y = logy, A = a, B=logb and X = x
5. If 1, 1, 3 are the root of $x^3 + ax^2 + bx + c + 0$ then ab-c equals_____.
   a) 32 b) -32 c) -18 d) 18.

ANSWER THE FOLLOWING IN ONE (OR) TWO SENTENCES. K2

6. Explain geometrical Interpretation.
7. Define Gauss-Elimination method.
8. Construct formula for Newton's Forward and Backward method.
9. Give Limitations of Regression Analysis.
10. Give a general way to ascertaining whether two variables are or not are related.

SECTION – B (5 X 5 = 25)

ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS. K3

11. a) Solve the equation $x^3 + x^2 - 1 = 0$ for the positive root by iteration method.

(OR)

b) Find the Positive root of x = cos x using Newton's method.

(CONTD …. 2)

12. a) Solve by Triangularization method, the following system: $x + 5y + z = 14$, $2x + y + 3z = 13$, $3x + y + 4z = 17$.

(OR)

b) By Gaussian Elimation, find the inverse of

$$A = \begin{pmatrix} 0 & 1 & 1 \\ 1 & 2 & 0 \\ 3 & -1 & -4 \end{pmatrix}$$

13. a) Using Lagrange's formula, prove: $y_1 = y_3 - 0.3\,(y_5 - y_{-3}) + 0.2\,(y_{-3} - y_{-5})$ nearly.

(OR)

b) Describe Trapezoidal rule with an Example.

14. a) Categorise Types of Correlation.

(OR)

b) Calculate the coefficient of correlation r_{12}:

Case	X_1	X_2	Case	X_1	X_2
A	10	9	E	12	11
B	6	4	F	13	13
C	9	6	G	11	8
D	10	9	H	9	4

15. a) Describe Regression analysis and its Uses in detail.

(OR)

b) Two regression lines of a sample are $X + 6Y = 6$ and $3X + 2Y = 0$. Find the correlation coefficient.

SECTION – C (5 X 8 = 40 MARKS)

ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS. K4 & K5

16. a) Find the positive root of $x - \cos x = 0$ by Bisection method.

(OR)

b) By Horner's method, find the root of $x^3 - 3x^2 + 2.5 = 0$ that lies between 2 and 3.

17. a) Apply Gauss-Jordan method to find the solution of the following system : $10x + y + z = 12$; $2x + 10y + z = 13$; $x + y + 5z = 7$.

(OR)

b) Solve the following system of equations by Gauss-Seidel method correct to three decimal places:

$$x + y + 54z = 110$$

$$27x + 6y - z = 85$$

$$6x + 15y + 2z = 72$$

(CONTD …. 2)

18. a) Find the first two derivations of $(x)^{1/3}$ at x = 50 and x = 56 given the table below:

x	50	51	52	53	54	55	56
$Y = x^{1/3}$	3.6840	3.7084	3.7325	3.7563	3.7798	3.8030	3.8259

(OR)

b) Evaluate $\int_0^1 e^x$ dx by Simpson's one-third rule correct to five decimal places, by proper choice of h.

19. a) Calculate coefficient of concurrent deviation from the following data :

Price	Import	Price	Import
368	22	384	26
384	21	395	24
385	24	403	29
361	20	400	28
347	22	385	27

(OR)

b) Explain Scatter Diagram methods in detail.

20. a) Discuss on Regression Equation of Y on X and X on Y.

(OR)

b) Difference between Correlation and Regression Analysis in detail.

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