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

SUBJECT CODE 23UCT1A1

REG.NO. :

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

END-OF-SEMESTER EXAMINATIONS : NOVEMBER – 2023

B.Sc. – COMPUTER TECHNOLOGY **MAXIMUM MARKS: 75**

SEMESTER : I **TIME : 3 HOURS**

PART – III

ALLIED 1: MATHEMATICS – I - MATHEMATICAL STRUCTURE FOR COMPUTER SCIENCE

SECTION – A (10 X 1 = 10 MARKS)

ANSWER THE FOLLOWING QUESTIONS.

MULTIPLE CHOICE QUESTIONS. (K1)

1. Which of the following is correct?
   (a) Determinant is a square matrix
   (b) Determinant is a number associated with a matrix
   (c) Determinant is a number associated with a square matrix
   (d) None of these
2. Which is more efficient method?
   (a) Gauss Elimination (c) Cramer's Rule
   (b) Gauss Jordan (d) Back substitution
3. Newton's forward and backward interpolation formula will be used for ____ intervals.
   (a) unequal (b) equal (c) infinite (d) finite
4. The best measure of central tendency is _____
   (a) arithmetic mean (b) harmonic mean (c) geometric mean (d) median
5. The correlation for the values of two variables moving in the same direction is _____
   (a) perfect positive (b) negative (c) positive (d) no correlation

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

6. Define orthogonal matrix.
7. What is the iterative formula to find the root of the equation $f(x) = x^3 - 5x + 7 = 0$ by Newton Raphson Method?
8. Write the formula of Taylor's series.
9. Find the quartile deviation if the quartile range is 36?
10. What is the condition for two regression lines to be parallel?

(CONTD…….2)

SECTION – B (5 X 5 = 25 MARKS)

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

(K3)

11. a) If $\Delta = \begin{vmatrix} 1 & x & x^2 \\ 1 & y & y^2 \\ 1 & z & z^2 \end{vmatrix}$, $\Delta_1 = \begin{vmatrix} 1 & 1 & 1 \\ yz & zx & xy \\ x & y & z \end{vmatrix}$, then prove that $\Delta + \Delta_1 = 0$

(OR)

b) Find the rank of the matrix $\begin{pmatrix} 1 & 2 & -1 & 3 \\ 2 & 4 & 1 & -2 \\ 3 & 6 & 3 & -7 \end{pmatrix}$

12. a) Show that the root of the equation $x^2 + 3x - 5 = 0$ lies in (1,2). Find the first three approximations to the roots of this equation using the bisection method.

(OR)

b) Find the solution to the following system of equations using the Gauss-Seidel method. $12x_1 + 3x_2 - 5x_3 = 1$, $x_1 + 5x_2 + 3x_3 = 28$, $3x_1 + 7x_2 + 13x_3 = 76$.

13. a) Use Newton's forward difference formula to find f(1895) from the data: f(1891) = 46, f(1901) = 66, f(1911) = 81, f(1921) = 93, f(1931) = 101.

(OR)

b) Using Simpson's one third rule, evaluate the value of $\int_0^1 \mathbf{e^x dx}$.

14. a) Find the arithmetic mean of the following using the step-deviation method.

Class Interval	0-10	10-20	20-30	30-40	40-50	50-60	60-70
Frequency	4	4	7	10	12	8	5

(OR)

b) Calculate the mean deviation from mean for the following data.

Class Interval	0-2	2-4	4-6	6-8
Frequency	4	2	5	3

15. a) Write the differences between correlation and regression.

(OR)

b) Calculate rank coefficient of correlation between the two kinds of assessment of graduate students' performance in a college.

Students	A	B	C	D	E	F	G	H	I
Int Exam	51	68	73	46	50	65	47	38	60
Ext Exam	49	72	74	44	58	66	50	30	35

(CONTD…….3)

SECTION – C (5 X 8 = 40 MARKS)

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

16. a) Find the inverse of the matrix $A = \begin{pmatrix} 2 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & -1 & 2 \end{pmatrix}$

(OR)

b) Find the eigen values and eigen vectors of $\begin{pmatrix} 5 & -10 & -5 \\ 2 & 14 & 2 \\ -4 & -8 & 6 \end{pmatrix}$

17. a) Find the value of the given variables by using Gauss elimination method: $x + y + z = 2$, $x + 2y + 3z = 5$, $2x + 3y + 4z = 11$.

(OR)

b) Find a root of an equation $f(x) = x^3 - x - 1$ using Newton Raphson method.

18. a) Compute $f'(1.1)$ and $f''(1.6)$ from the given data

X	1.0	1.1	1.2	1.3	1.4	1.5	1.6
Y	7.989	8.403	8.781	9.129	9.451	9.750	10.031

(OR)

b) Consider an ordinary differential equation $dy/dx = x^2 + y^2$, $y(1) = 1.2$. Find $y(1.05)$ using the fourth order Runge-Kutta method.

19. a) The length of 20 similar crystals is measured (in mm) in a chemistry experiment. Calculate the standard deviation and the coefficient of variation for the observations taken.

Crystal No.	1	2	3	4	5	6	7	8	9	10
Length (mm)	9	2	5	4	12	7	8	11	9	3

Crystal No.	11	12	13	14	15	16	17	18	19	20
Length (mm)	7	4	12	5	4	10	9	6	9	4

(OR)

(CONTD…….4)

b) The number of vehicles sold by a major Toyota Showroom in a day was recorded for 10 working days. The data is given as

Day	1	2	3	4	5	6	7	8	9	10
Frequency	20	15	18	5	10	17	21	19	25	28

Find the Quartile Deviation and its coefficient for the given discrete distribution case.

20. a) Fit a second degree curve of regression of y on x to the following data :

X	1	2	3	4
Y	6	11	18	27

(OR)

b) From following information estimate the correlation coefficient between advertisement expenses and sales volume using Karl Pearson's coefficient of correlation method.

Firm	1	2	3	4	5	6	7	8	9	10
Adv Exp	11	13	14	16	16	15	15	14	13	13
Sales Volume	50	50	55	60	65	65	65	60	60	50

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