15223

Reg. No.

II Semester B.C.A. Degree Examination, September/October - 2022

COMPUTER SCIENCE

Numerical and Statistical Methods

(CBCS Scheme)

Time : 3 Hours

Maximum Marks : 100

Instructions to Candidates:

Answer **all** sections.

SECTION - A

I. Answer any Ten questions. Each question carries Two marks.   (10×2=20)

1.   Multiply $+0.3423E12 \times 0.3215E-15$.

2.   Mention four types of errors.

3.   Write the formula for Newton - Raphson method.

4.   Write the Lagrange's Interpolation formula.

5.   Construct the difference table for the following table.

x	0	1	2	3	4	5
$f(x)$	1	2	4	7	11	16

6.   Write the Simpson's $\frac{1}{3}^{rd}$ rule formula.

7.   Explain Gauss-Jacobi Method for solving system of linear equations.

8.   Write the formula for Harmonic mean for discrete series.

9.   Define correlation.

10. Write the formula for spearman's rank correlation coefficient.

11. If $P(B) = 1/5$ and $P(A \wedge B) = 1/4$ then find $P(A/B)$

12. Find the probability of getting a head tossing a coin.

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SECTION - B

II. **Answer any Six of the following. Each question carries 5 marks.** $(6\times5=30)$

13. Find the root of the equation $x^3 - 4x - 9 = 0$ lies between 2 and 3 to the bisection method in 4 stages.

14. Estimate $f(2.5)$ from the following table.

x	1	2	3	4	5	6
$f(x)$	1	8	27	64	125	216

15. Find $f(6)$ using lagrange's interpolation formula from the following data.

x	3	7	9	10
$f(x)$	168	120	72	63

16. Evaluate $\int\limits_{0}^{6} \dfrac{dx}{1+x^2}$ by using Trapezoidal rule.

17. Evaluate $\int\limits_{0}^{3} \dfrac{dx}{(1+x)^2}$ by using simpson's $\left(\dfrac{3}{8}\right)^{th}$ rule taking $n = 1$.

18. Solve by Gauss -Elimination method

$$x + y + z = 9$$
$$2x - 3y + 4z = 13$$
$$3x + 4y + 5z = 40$$

19. Solve by using colout's LV decomposition method

$$x_1 + x_2 + x_3 = 1$$
$$4x_1 + 3x_2 - x_3 = 6$$
$$3x_1 + 5x_2 + 3x_3 = 4$$

20. Solve by Jacobi's iteration method

$20x + y - 2z = 17$
$3x + 20y - z = -18$
$2x - 3y + 20z = 25$

SECTION - C

III. Answer any Six of the following. Each question carries 5 marks.   (6×5=30)

21. Solve the system of equations by Gauss Jacobi method.

$10x + 2y + z = 9$
$x + 10y - z = -22$
$2x - 3y - 10z = -22$

22. Use power method to find the largest eigen value of the matrix $A = \begin{bmatrix} 4 & 2 \\ 1 & 3 \end{bmatrix}$

23. Solve the following system of equations by Gauss seidel method

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

24. Use Taylor's series method to find y at $x = 0.2$ considering terms upto the third degree given

$\dfrac{dy}{dx} = x^2 + y^2$ and $y(0) = 1$.

25. Using Picard's method, solve $\dfrac{dy}{dx} = x - y^2$; $x_0 = 0, y_0 = 1$ find $y(0.1)$ correct to four decimal places.

26. By using Runge-Kutta method of 4th order, solve $\dfrac{dy}{dx} = x + y^2$, $y(0) = 1$ for $x = 0.2$

27. Find the mean of the following frequency distribution.

Class	0-5	5-10	10-15	15-20	20-25	25-30	30-35
Frequency	2	4	5	3	2	4	5

28. State and Prove Baye's theorem.

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SECTION - D

IV. Answer any four of the following. Each question carries five marks. (4×5=20)

29. Calculate Karl pearson's skewness and coefficient of Skewness of the following data (5)

x	10	20	30	40	50	60
y	3	7	10	20	6	4

30. Calculate standard deviation from the following data. (5)

Salaries in Thousands	45	50	55	60	65	70	75	80
Number of persons	3	5	8	7	9	7	4	7

31. Find the rank correlation coefficient for the following data: (5)

x	65	45	67	38	48	50	26	47	70	62
y	64	40	58	46	52	49	38	47	59	60

32. Two cards are drawn from well-shuffled pack of 52 cards. Find the probability that they are both aces if the first card is

    a) Replaced

    b) Not replaced. (5)

33. If A and B are two events then prove that $P\left(A/\overline{B}\right)=\dfrac{P(A)-P(A/B)}{1-P(B)}$ where $P(B)\neq 1$.

34. Find the probability in a family of 4 children there will be

    a) Atleast one boy.

    b) Atleast one boy and atleast one girl.

    Assume that the probability of male birth is $\dfrac{1}{2}$.

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II Semester B.C.A. Degree Examination, August/September – 2023

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PART - A

I. Answer any Ten of the following: (10×2=20)

1. Multiply + 0.5543 E12 ×0.4111E-15.

2. Define

   i) Truncation error

   ii) Relative error.

3. Writ the formula for Newton-Raphson method.

4. Construct the difference table for the following data

x	0	1	2	3	4	5
f(x)	1	3	7	21	27	38

5. Write the Lagrange's interpolation formula

6. Explain Gauss Elimination method of solving linear equations of the form $AX = B$.

7. Write the Simpson's $\left(\dfrac{1}{3}\right)^{rd}$ Rule formula

8. Define power method.

9. Find the median for the following data

x	5	15	22	7	8	13	20

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10. Write the alternative formula to calculate Karl Pearson's coefficient of correlation.

11. Find the coefficient of variation given that mean is 9.58 and standard deviation 14.20.

12. Find the probability of getting 6 on throwing unbiased die?

PART - B

II. **Answer any Six of the following** (6×5=30)

13. Find a real root of the equation $x^2 - 4x - 9 = 0$ using Bisection method in four stages lies in the interval (2,3).

14. Use Newton - Backward interpolation formula find f(84) from the following data

x	40	50	60	70	80	90
f(x)	184	204	226	250	275	304

15. Estimation f(6) using Lagrange's interpolation formula from the following data

x	3	7	9	10
f(x)	168	120	72	63

16. Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by using Trapezoidal rule by taking $h = 1$.

17. Evaluate $\int_0^1 \frac{dx}{1+x}$ using Simpson's $\left(\frac{3}{8}\right)^{th}$ rule.

18. Solve using Crout's LU decomposition method

$x + y + z = 1$

$4x + 3y - z = 6$

$3x + 5y + 3z = 4$

19. Solve the system of equations by Cholesky method.

$x + 2y + 3z = 5$

$2x + 8y + 22z = 6$

$3x + 22y + 82z = -10$

20. Determine the single precision and double precision machine representation of the decimal number 492.788125.

PART-C

III. **Answer any Six of the following.** (6×5=30)

21. Solve by Gauss - Seidel method

$10x + y + z = 12$

$x + 10y + z = 12$

$x + y + 10z = 12$

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22. Solve the system of equations by Gauss Jacobi iterative method.

$10x + 2y + z = 9$

$x + 10y - z = -22$

$2x - 3y - 10z = -22$

23. Find the largest eigen value and corresponding eigen vector by using power method

$$A = \begin{bmatrix} 5 & 4 \\ 1 & 2 \end{bmatrix}$$

24. Using Taylor's series method to find y at $x = 1.1$ and 1.2 considering terms up to third degree given that $\frac{dy}{dx} = x + y$, $y(1) = 0$

25. Solve $\frac{dy}{dx} = y - x^2$, $y(0) = 1$ by Picard's method up to 3rd approximation. Hence find the value of $y(0.1)$

26. Using Runge - Kutta method of IV - order solve $\frac{dy}{dx} = 3x + \frac{y}{2}$ with $y(0) = 1$ find $y(0.2)$ by taking h = 0.2.

27. Calculate H.M from the following data 85, 70, 10, 75, 100, 8, 42, 250, 40, 36

28. If A and B are two events such that $P(A) = \frac{1}{4}$ $P(B) = \frac{1}{2}$ $P(A \cap B) = \frac{1}{8}$ find

   i) $P(A \text{ or } B)$

   ii) $P(\text{not } A \text{ and not } B)$

PART - D

IV. Answer any Four of the following : (4×5=20)

29. Find mean and standard deviation from the following data

Marks	0-10	10-20	20-30	30-40	40-50	50-60
No. of students	10	5	30	25	10	20

30. Calculate Karl - Pearson's Coefficient of skewness from the following data
25, 15, 23, 40, 27, 25, 23, 25, 20

31. Find the rank correlation coefficient for the following data

x	65	45	67	38	48	50	26	47	70	62
y	64	40	58	46	52	49	38	47	59	60

[P.T.O.

32. If A and B are two events then prove that $P\left(A / \overline{B}\right) = \dfrac{P(A) - P(A \cap B)}{1 - P(B)}$ where $P(B) \neq 1$

33. A man is known to speak truth 3 out of 4 times. He throws a die and reports that it is a six. Find the probability that it is actually six.

34. Find the probability that in a family of 4 children there will be

    i) At least one boy

    ii) At least one boy and atleast one girl. Assume that the probability of male birth is $\dfrac{1}{2}$.