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Reg. No. | | | | | | | | |

II Semester B.C.A. Degree Examination, September - 2021
COMPUTER SCIENCE
Numerical and Statistical Methods
(CBCS Scheme)

Time : 3 Hours **Maximum Marks : 100**

Instructions to Candidates:

1. Answer **ALL** Sections.

SECTION - A

I. Answer any **TEN** of the following questions. Each question carries **TWO** Marks. **(10×2=20)**

1. Mention Four Types of Errors.
2. Multiply 0.1111E51 × 0.4444E50.
3. Write the formula for Newton-Raphson Method.
4. Write Newton's Forward Interpolation Formula.
5. Construct the difference table for the following data:

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

6. Write the Lagrange Interpolation Formula.
7. Write the Simpson's $\frac{1}{3}^{rd}$ rule Formula.
8. Write the Formula for Harmonic mean for Discrete Series.
9. Write the Formula to calculate the Standard Deviation by Actual Mean method.
10. Define Correlation.
11. Write the alternate formula for Karl Pearson's Coefficient of Correlation.
12. If P(B) = $\frac{7}{10}$ and $P(A \cap B) = \frac{4}{10}$ find P(A/B).

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SECTION - B

II. Answer any **SIX** of the following. Each question carries **FIVE** Marks. **(6×5=30)**

13. Find the root of the equation $x^3 - x - 1 = 0$ using bisection method in five stages lies in the interval (1, 1.5)

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. Using Lagrange's Interpolation Formula find f(10) from the following data.

x	5	6	9	11
$f(x)$	12	13	14	16

16. Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by Trapezoidal rule by dividing the interval [0 6] into 6 equal parts.

17. Evaluate $\int_0^3 \frac{dx}{(1+x)^2}$ by Simpson's $\left(\frac{3}{8}\right)^{th}$ rule by taking h=1.

18. Solve by Gauss-Seidal Method.

$$10x + y + z = 12$$
$$x + 10y + z = 12$$
$$x + y + 10z = 12$$

19. Solve by using Crout's LU decomposition method.

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

20. Determine the machine representation of the decimal number 492.234375 in both single precision and double precision.

SECTION - C

III. Answer any **SIX** of the following. Each question carries **FIVE** Marks. **(6×5=30)**

21. Solve the system of equations by Gauss Elimination Method.

$x+2y+z=3,\ 2x+3y+3z=10,\ 3x-y+2z=13.$

22. Solve the System of equations by Gauss-Jacobi Method.

$10x+y+z=12,\ 2x+10y+z=13,\ 2x+2y+10z=14$

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

$$A=\begin{bmatrix}1 & 2\\ 3 & 4\end{bmatrix}$$

24. Using Taylor's Series Method, Find y at $x=1.1$ Considering terms upto third degree given that $\frac{dy}{dx}=x+y, y(1)=0.$

25. Solve $\frac{dy}{dx}=xy, y(1)=2$, find the approximate solution at $x=1.2$ using Runge-Kutta method by taking h=0.2

26. Solve $\frac{dy}{dx}=x+y^2,\ y(0)=1$ by Picard's method upto 2nd approximation. Hence find the value of $y(0.1)$.

27. Calculate Mean from the following data by Step deviation Method.

Roll No.s	1	2	3	4	5	6	7	8	9	10
Marks	40	50	55	78	58	60	73	43	48	35

28. State and Prove Baye's Theorem.

SECTION - D

IV. Answer any **FOUR** of the following. Each question carries **FIVE** Marks. **(4×5=20)**

29. Calculate Standard deviation from the following Data.

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

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30. Calculate Karl Pearson's Coefficient of Skewness for the following data.

25, 15, 23, 40, 27, 25, 23, 25, 20.

31. Calculate the Coefficient of Correlation from the following data

x	1	2	3	4	5	6	7
y	9	8	10	12	11	13	14

32. If A and B are events with

$P(A \cup B) = \frac{7}{8}, P(A \cap B) = \frac{1}{4}$ *and* $P(\overline{A}) = \frac{5}{8}$ *find* $P(A), P(B)$ *and* $P(A \cap \overline{B})$

33. Find the Probability that in a family of 4 Children there will be

i) Atleast one boy.

ii) Atleast one boy and atleast one girl.

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

34. If A and B are two events, then prove that.

$$P(A/\overline{B}) = \frac{P(A) - P(A \cap B)}{1 - P(B)}$$

Where $P(B) \neq 1$.