END TERM EXAMINATION
SECOND SEMESTER [BCA] MAY-JUNE, 2025

Paper Code: BCA-102	**Subject: Applied Mathematics**
Time: 3 Hours	**Maximum Marks: 60**

Note: Attempt any Five questions including Q.No.1 which is compulsory. Assume missing data if any.

Q1 Attempt **any four** of the following questions: **(4*5=20)**
   (a) Define the probability. Find the probability of getting a multiple of 2 or 3 when a die is thrown.
   (b) Prove that the mean of binomial distribution is np where P is probability.
   (c) Evaluate $\Delta^n a^x$, interval of differencing being h.
   (d) Define the forward difference operator and prove that $E = 1 + \Delta$.
   (e) Find the inverse of the matrix by Gauss-Jordan method,
   $$A = \begin{bmatrix} 2 & 2 & 1 \\ 1 & 0 & 2 \\ 2 & 1 & 2 \end{bmatrix}$$
   (f) Find the derivative of f(x) at x=0, from the following table:

x:	0	1	2	3	4	5
f(x):	4	8	15	7	6	2

   (g) Find the solution region satisfied by the inequalities,
   $2x + y \le 4$, $3x + 3y \ge 1, x - y \le 1$, $x \ge 0, y \ge 3$
   (h) Define linear programming with example.

Q2 Out of 800 families with 4 children each, how many families would be expected to have,   **(10)**
   (a) Two boys and two girls
   (b) At least one boy
   (c) No girls
   (d) At most two girls.
   Assuming equal probabilities for boys and girls.

OR

Q3 During war, 1 ship out of 9 was sunk on an average in making a certain voyage. What was the probability that exactly 3 out of a convoy of 6 ships would arrive safely?   **(10)**

Q4 Use Lagrange's interpolation formula, find the value of 'y' when x = 10 from the following table   **(10)**

X:	5	6	9	11
Y:	12	13	14	16

OR

Q5 Find the real root of the equation $x^4 - x - 9 = 0$ by the Newton's-Raphson method.   **(10)**

Q6 Solve the system of linear equations by using LU decomposition method,
$X + 2y + 3z = 14$, $2x + 5y + 2z = 18, 3x + y + 5z = 20$ **(10)**

OR

Q7 Evaluate $\int_2^{10} dx/(1+x)$ by dividing the range into eight equal parts by Simpson's one-third rule. Also find the value of $\log_e 3.66$.   **(10)**

Q8 Solve the following LPP by Simplex method,

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Maximize $Z = 20 x_1 + 30 x_2$ subject to constraints $3x_1 + 3x_2 \leq 36$, $5x_1 + 2x_2 \leq 50$, $2x_1 + 6x_2 \leq 60$, $x_1, x_2 \geq 0$.

Write the dual of the above problem and solve it by complex method. Verify that object function of both is same. **(10)**

OR

Q9 Find different machines can not do any of five required jobs, with different profit resulting from each assignment as shown in the adjoining table. Find out maximum profit possible through optimal assignment. **(10)**

Machines

		A	B	C	D	E
	1	30	37	40	28	40
	2	40	24	27	21	36
Jobs	3	40	32	33	30	35
	4	25	38	40	36	36
	5	29	62	41	34	39

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