398, Ramkrishnapur Road, Barasat
Kolkata, West Bengal-700125

BRAINWARE UNIVERSITY

Term End Examination 2024-2025
Programme – BCA-Hons-2024/BCA(MAWT)-Hons-2024
Course Name – Mathematics and Numerical Methods
Course Code - BCA10001/BMT10001
(Semester I)

Time : 2:30 Hours

Full Marks : 60
[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A
(Multiple Choice Type Question) 1 x 15=15

1. *Choose the correct alternative from the following :*

(i) If A is an orthogonal Matrix then identify the correct option.

a) $A^T = -A^{-1}$ b) $A = -A^{-1}$
c) $A = A^{-1}$ d) $A^T = A^{-1}$

(ii) Select the correct choice.

a) $(AB)^T = A^T B^T$ b) $(AB)^T = AB$
c) $(AB)^T = B^T A^T$ d) $(AB)^T = BA$

(iii) If A is an invertible matrix select the right one.

a) $A^{-1} = \frac{1}{|A|}(adj\ A)$ b) $A^{-1} = -A$
c) $A^{-1} = 1/A$ d) $A^{-1} = A$

(iv) Select the value of $\lim_{x \to 0} \frac{\sin x}{x}$

a) 0 b) limit does not exist
c) 1 d) x

(v) Identify the value of $\lim_{x \to 3} \frac{x^2 - 9}{x - 3}$

a) 6 b) 1

c) 3 d) 0

(vi) Select the differentiability of the function $f(x) = |x|$

a) differentiable everywhere b) differentiable nowhere

c) not differentiable at $x=0$ d) none of these.

(vii) Identify the number of significant figures in 0.03409

a) 5 b) 6

c) 7 d) 4

(viii) Select the correct option. The kind of error when 3.14 is approximate values of π is

a) inherent error b) truncation error

c) round-off error d) percentage error

(ix) Identify the percentage error in approximating $\frac{4}{3}$ to 1.3333.

a) 0.0025% b) 25%

c) 0.00025% d) 0.25%

(x) Select the correct option. Write the rate of convergence of Bisection method is

a) linear b) quadratic

c) cubic d) None of these.

(xi) Select the correct option. Newton- Raphson method for solution of the equation $f(x) = 0$ fails when

a) $f'(x) = 1$ b) $f'(x) = 0$

c) $f'(x) = -1$ d) None of these.

(xii) Select the following option that represent an iterative method

a) Gauss Elimination Method b) Gauss Jordan Method

c) LU decomposition Method d) Gauss-Seidel Method

(xiii) Choose the correct option. The interval for Newton's forward interpolation should be select as

a) equally spaced b) not equally spaced

c) may be equally spaced d) none of these.

(xiv) Choose the correct option. Lagrange's interpolation formula for two points of interpolation indicates a

a) parabola b) circle

c) straight line

d) none of these.

(xv) Choose the correct option. Rewrite $\nabla^3(y_0)$.

a) $y_3 - 3y_2 + 3y_1 - y_0$

b) $y_2 - 2y_1 + y_0$

c) $y_3 + 3y_2 + 3y_1 + y_0$

d) none of these.

Group-B

(Short Answer Type Questions) 3 x 5=15

2. Identify the values of x and y of the system of equations by Cramer's rule $2x+y=0$ and $x-2y=1$ (3)

3. Illustrate the limit: $\lim_{x\to 1} \frac{x^2-1}{\sqrt{5x+1}+\sqrt{3x+1}}$. (3)

4. Identify the approximate value of $\frac{\pi}{4}$ correct to 4 significant figures and then record the absolute error. (3)

5. Identify the interval where a positive root of $e^x - 3x = 0$ lies. (3)

6. Justify that $\Delta = E - 1$. (3)

OR

Evaluate the forward difference table for the following data: (3)

x	0	1	2	3
$f(x)$	1	2	11	34

Group-C

(Long Answer Type Questions) 5 x 6=3

7. Calculate the value of x such that $\begin{pmatrix} \frac{2}{5} & x \\ \frac{1}{5} & \frac{1}{5} \end{pmatrix}$ becomes the inverse of $\begin{pmatrix} 1 & 3 \\ -1 & 2 \end{pmatrix}$.