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BRAINWARE UNIVERSITY

Term End Examination 2025-2026
Programme – BCA-Hons-2024/BCA(MAWT)-Hons-2024/BCA-Hons-2025/BCA(MAWT)-Hons-2025
Course Name – Mathematics and Numerical Methods
Course Code - BCA10001/BMT10001
(Semester I)

Full Marks : 60 **Time : 2:30 Hours**

[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) Select the value of the matrix $\begin{vmatrix} 5 & 6 \\ -1 & 2 \end{vmatrix}$.

a) 14 b) 16

c) 2 d) None of these

(ii) 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) $A^T = A^{-1}$

(iii) Identify the value of a skew-symmetric determinant of odd order.

a) 1 b) -1

c) 0 d) None of these

(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) The function $f(x)$ is continuous at a point $x=a$. Then select right one from the following

a) $\lim_{x \to a^+} f(x) = \lim_{x \to a^-} f(x) = f(a)$ b) $\lim_{x \to a} f(x) = f(a)$

c) both $\lim_{x\to a^+} f(x) = \lim_{x\to a^-} f(x) = f(a)$ and $\lim_{x\to a} f(x) = f(a)$

d) none of these.

(vi) Identify the derivative of $f(x)=2x^3-3x^2+4x-5$ with respect to x

a) $6x^2-6x+4$

b) $6x^2-6x$

c) $6x^2-6x+5$

d) $6x^2-3x+4$

(vii) Identify the number of significant figures in 0.03409

a) 5

b) 6

c) 7

d) 4

(viii) Select the correct option. After being rounding off to three places of decimal the number 57.1092 becomes

a) 57.109

b) 57.100

c) 57.110

d) 0.109

(ix) Select the correct option. If 1.005723 is rounded-off the number up to three significant digits then identify the correct answer.

a) 1.00

b) 1.005

c) 1.01

d) none of these.

(x) Select the correct option. Diagonal dominance is to be used in

a) Gauss-Seidel method

b) Gauss Elimination method

c) LU factorization method

d) All of these

(xi) Identify, the accuracy attainable with Newton-Raphson method

a) does not depend upon the value of the derivative $f(x)$.

b) depend upon the value of derivative of $f(x)$.

c) may depend upon the value of derivative of $f(x)$.

d) none of these.

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

a) linear

b) quadratic

c) cubic

d) None of these.

(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. Examine which of the following is false.

a) $\Delta.\nabla = \nabla - \Delta$

b) $\Delta.\nabla = \Delta - \nabla$

c) $E.\Delta = \Delta.E$

d) $\Delta + 1 = E$

(xv) Choose the correct option. A root of the equation $x^3 - x - 1 = 0$needs to be found by Newton-Raphson method. If the initial guess x_0 as 2, then calculate new estimate $x_1$after first iteration is

a) $\frac{5}{11}$

b) $\frac{17}{11}$

c) $\frac{5}{12}$

d) $\frac{12}{17}$

Group-B
(Short Answer Type Questions) 3 x 5=15

2. Identify the value of $\begin{vmatrix} 1 & 1 & 2 \\ 3 & 1 & 2 \\ 3 & 1 & 1 \end{vmatrix}$. (3)

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

4. Identify the subtraction of the number 57.4662 from 786.85, up to 5-significant digits. (3)

5. Discuss the advantages and disadvantages of Newton Raphson method. (3)

6. Evaluate $\left(\frac{\Delta^2}{E}\right)x^2$ (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=30

7. Use Cramer's rule to solve the system $-4x + 2y - 9z = 2$, $3x + 4y + z = 5$, $x - 3y + 2z = 8$. (5)

(5)

8. Write the value of $\begin{vmatrix} 1+a & 1 & 1 \\ 1 & 1+b & 1 \\ 1 & 1 & 1+c \end{vmatrix}$.

(5)

9. Illustrate the value of $\frac{dy}{dx}$ if $y = \frac{x^2-x+1}{x^2+x+1}$

(5)

10. Calculate the relative error and percentage error in approximating $\frac{7}{6}$ to 1.6666.

(5)

11. Evaluate the value of x_1, x_2, x_3 from the following system of equations by Gauss elimination method:

$$2x_1 + 3x_2 + x_3 = 9$$
$$x_1 + 2x_2 + 3x_3 = 6$$
$$3x_1 + x_2 + 2x_3 = 8.$$

correct up to two decimal places.

(5)

12. Evaluate the value of $(\Delta^2)x^3$is, when $h=1$.

OR

(5)

Calculate that the second-degree polynomial passes through (0,1), (1,3), (2,7), (3,13) is $x^2 + x + 1$.

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