18149

BRAINWARE UNIVERSITY

Term End Examination 2025-2026
Programme – B.Sc.(Ag)-Hons-2025
Course Name – Introductory Mathematics
Course Code - BAG00002
(Semester I)

Full Marks : 50 **Time : 2:0 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 20=20

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

(i) In $\begin{vmatrix} 3 & -2 & 5 \\ -1 & 2 & -3 \\ -5 & 6 & 9 \end{vmatrix}$, identify the minor and co-factor of -2 .

a) -24, 24
b) 24, -24
c) -24, -24
d) none

(ii) Identify the nature of the matrix $\begin{pmatrix} 1 & 2 \\ 0 & 3 \end{pmatrix}$.

a) a diagonal matrix
b) an upper triangular matrix
c) a lower triangular matrix
d) a symmetric matrix

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

a) 0
b) -1
c) 19
d) none

(iv) If A= $\begin{pmatrix} 1 & 4 & 3 \\ 2 & 6 & 3 \\ 3 & 8 & 1 \end{pmatrix}$, then identify the value of A^T.

a) $\begin{pmatrix} 1 & 2 & 3 \\ 4 & 6 & 8 \\ 3 & 3 & 1 \end{pmatrix}$
b) $\begin{pmatrix} 1 & 2 & 3 \\ 9 & 6 & 8 \\ 3 & 4 & 1 \end{pmatrix}$
c) $\begin{pmatrix} 3 & 2 & 3 \\ 4 & 5 & 8 \\ 3 & 3 & 1 \end{pmatrix}$
d) $\begin{pmatrix} 1 & 2 & 3 \\ 4 & 6 & 8 \\ 4 & 3 & 0 \end{pmatrix}$

(v) Select the value of the determinant $\begin{vmatrix} 11 & 22 & 11 \\ 19 & 38 & 19 \\ 13 & 26 & 13 \end{vmatrix}$.

a) 4 b) 0
c) -1 d) none

(vi) If A= $\begin{pmatrix} 2 & 14 & 5 \\ 0 & 15 & 3 \\ 3 & 17 & 2 \end{pmatrix}$, then select the value of A^T.

a) $\begin{pmatrix} 1 & 2 & 3 \\ 4 & 6 & 8 \\ 3 & 3 & 1 \end{pmatrix}$ b) $\begin{pmatrix} 1 & 0 & 3 \\ 4 & 1 & 6 \\ 5 & 3 & 1 \end{pmatrix}$

c) $\begin{pmatrix} 2 & 0 & 3 \\ 14 & 15 & 17 \\ 5 & 3 & 2 \end{pmatrix}$ d) $\begin{pmatrix} 1 & 2 & 3 \\ 4 & 6 & 8 \\ 4 & 3 & 0 \end{pmatrix}$

(vii) If A= $\begin{pmatrix} 2 & 7 \\ 8 & 9 \end{pmatrix}$ and B= $\begin{pmatrix} 2 & 10 \\ 7 & 15 \end{pmatrix}$, then identify the value of A-B.

a) $\begin{pmatrix} 0 & -3 \\ 1 & -6 \end{pmatrix}$ b) $\begin{pmatrix} 42 & 0 \\ 1 & -42 \end{pmatrix}$
c) $\begin{pmatrix} 22 & -52 \\ 10 & 0 \end{pmatrix}$ d) none

(viii) Select the correct option: Sum of first 20 terms of the AP 2, 5, 8, ... is

a) 590 b) 620
c) 630 d) 570

(ix) Select the correct option: If a GP has first term 5 and common ratio 2, sixth term is

a) 160 b) 180
c) 150 d) 175

(x) Select the correct option: Second term of HP: 1, 1/2, 1/3, ... is

a) 2 b) 1/2
c) 1 d) 1/3

(xi) If $y=\log(\log x)$ (base of the log is e) then calculate the value of $\frac{dy}{dx}$

a) $\frac{1}{\log x}$ b) $\frac{1}{x\log x}$
c) $\frac{x}{\log x}$ d) none of these

(xii) Choose the correct option: A quadratic model includes a term with

a) x b) x^2
c) log x d) $\sqrt{x}$

(xiii) Choose the correct option: Least squares method minimizes

a) time b) error sum of squares
c) model length d) cost

(xiv) Choose the correct option: A linear model fits well when the plot of data shows

a) curve b) random spikes
c) straight-line pattern d) no pattern

(xv) Select the correct option: Exponential models commonly use the function

a) $y = ax^2 + bx + c$ b) $y = a + bx$
c) $y = a * e^{(bx)}$ d) $y = \log(x)$

(xvi) Select the correct option: Time series data in agriculture may require

a) frequency models
b) regression models
c) exponential smoothing
d) all of the these

(xvii) Choose the correct answer: Marginal revenue is obtained by differentiating

a) Profit function
b) Cost function
c) Revenue function
d) Supply function

(xviii) Choose the correct answer: A function *f(x,y)* has a local maximum at a point if

a) First derivatives are non-zero
b) First derivatives vanish and second derivative test is satisfied
c) Gradient is positive
d) Partial derivatives are undefined

(xix) Choose the correct answer: If $f(x,y)=x^3+y^3-3xy$, then f is

a) Homogeneous of degree 1
b) Homogeneous of degree 2
c) Homogeneous of degree 3
d) Not homogeneous

(xx) Choose the correct answer: Marginal product is found by

a) Integrating production function
b) Differentiating production function w.r.t. input
c) Multiplying cost and output
d) Adding all inputs

Group-B

(Short Answer Type Questions) 2.5 x 10=25

2. Evaluate the value of $\frac{d}{dx}(x\ cosx)$. (2.5)

3. Identify the value of $\int(\frac{1}{x}+x^3+x^6)dx$. (2.5)

4. Identify the value of $\int x\sin x\,dx$. (2.5)

5. If $A=\begin{bmatrix}1 & 3\\ -1 & 2\end{bmatrix}$ and $B=\begin{bmatrix}1 & 2\\ 4 & -1\end{bmatrix}$. Calculate the matrix $A+2B$. (2.5)

6. If $A=\begin{bmatrix}1 & 3\\ -1 & 2\end{bmatrix}$ and $B=\begin{bmatrix}1 & 2\\ 4 & -1\end{bmatrix}$. Calculate the matrix $2A-B$. (2.5)

7. Calculate A^{-1} if the matrix is $A=\begin{bmatrix}1 & 0\\ 0 & 1\end{bmatrix}$. (2.5)

8. Show that $(A^T)^T=A$ with example. (2.5)

(2.5)

9. Calculate A^2 if $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$

(2.5)

10. Calculate $\frac{dy}{dx}$ given that $y = \frac{x-1}{x+1}$

(2.5)

11. Evaluate the value of $\frac{d}{dx}(x\ sinx)$.

OR

(2.5)

Evaluate the value of $\frac{d}{dx}(x^2\ cosx)$.

Group-C

(Long Answer Type Questions) 5 x 1=5

12. Evaluate the derivative of x^2 by definition. (5)

OR

(5)

If $A = \begin{pmatrix} -10 & 3 & 5 \\ 1 & -13 & -5 \\ -1 & 0 & 5 \end{pmatrix}$ and $B = \begin{pmatrix} 26 & -2 & 4 \\ -1 & 31 & 4 \\ 0 & -2 & -3 \end{pmatrix}$, evaluate the matrix A.B.

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