

**SEMESTER END THEORY EXAMINATION**

**B.Tech. (Biotechnology)/ B.Tech. (Food Tech.)/ B.Tech. (Agricultural Engineering)**

Semester	: I (New)	[ICAR - Sixth Deans' Committee Syllabus]	Acad. Year	: 2025-26
Course No.	: MATH-111	Title	: Basic Mathematics	
Credit Hrs.	: 2(2+0)			
Day, Date	: Tuesday, 10.02.2026	Time	: 10:00 to 12:30 hrs.	Total Marks : 50

Note: Draw neat diagram wherever necessary

<b>SECTION 'A' : Questions with Descriptive Long Answers (Any 5)</b>		<b>Marks</b>
Q.1	Evaluate $\int \frac{\cos(\log x)}{x} dx$ .	6
Q.2	If $f(x) = \frac{x+1}{x-1}$ , show that $f[f(x)] = x$ .	6
Q.3	Solve by Cramer's rule: $x + y = 3$ , $y + z = 5$ , $z + x = 4$ .	6
Q.4	If $y = \log(\sec x + \tan x)$ , then find $\frac{dy}{dx}$ .	6
Q.5	a) Evaluate $\int x(x+1)^2 dx$ .	4
	b) Find $\frac{dy}{dx}$ , if $y = x^{10} + e^x$ .	2
Q.6	a) If $x = \begin{bmatrix} 1 & 2 \\ -3 & 4 \end{bmatrix}$ , $y = \begin{bmatrix} 4 & 5 \\ 1 & -3 \end{bmatrix}$ , $z = \begin{bmatrix} 7 & 11 \\ -8 & 9 \end{bmatrix}$ , Show that $3x + y = z$ .	3
	b) If $f(x) = x^2$ then, find $f(2)$ .	1.5
	c) Find $\frac{dy}{dx}$ , if $y = x^{12}$ .	1.5
Q.7	a) Evaluate $\int x \cdot \sin x dx$ .	3
	b) i. Evaluate $\int \sin x dx$ .	1.5
	ii. Find $\lim_{x \rightarrow 2} (x^2 + 3x)$ .	1.5

<b>SECTION 'B' : Questions with Descriptive Short Answers (Any 5)</b>		<b>Marks</b>
Q.8	State Product rule in differentiation.	2
Q.9	Find derivative of $y = \log(x^2)$ .	2
Q.10	State Rule of Integration by parts.	2
Q.11	State Quotient rule in differentiation.	2
Q.12	Find determinant of $ A  = \begin{vmatrix} 1 & 4 & 1 \\ 0 & -1 & 3 \\ 6 & 0 & 2 \end{vmatrix}$ .	2
Q.13	If $A = \begin{bmatrix} 1 & 3 \\ 1 & 2 \end{bmatrix}$ , then find $A^2$ .	2

**(P.T.O.)**

## SECTION 'C' : Objective-type Compulsory Questions

Q.14 Define the following terms:

5

- 1) Diagonal matrix
- 2) Function
- 3) Continuity
- 4) Differentiation
- 5) Limit

Q.15 Fill in the blanks:

5

- 1) The derivative of any constant term is always \_\_\_\_\_.
- 2)  $\int x =$  \_\_\_\_\_.
- 3)  $\frac{d}{dx}(1) =$  \_\_\_\_\_.
- 4) Identity matrix is denoted by \_\_\_\_\_.
- 5)  $\int dx$  is \_\_\_\_\_.
- 6) Derivative of  $\frac{d}{dx}(\log x)$  is \_\_\_\_\_.
- 7) Null matrix is a matrix in which all the elements are \_\_\_\_\_.
- 8) Integration of  $\int 2 dx$  is \_\_\_\_\_.
- 9)  $\frac{d}{dx}(u + v) =$  \_\_\_\_\_.
- 10)  $e^x$  is the only function, which has derivative and integration is \_\_\_\_\_.

