

2025
(B.Sc 2nd Semester)
MDC-2

BASIC MATHEMATICS

University Roll No. _____

Registration No. _____

Full marks : 37.5

Pass marks : 40%

Time : 2 hours

Section – I

(Marks : 7.5)

A. Choose the correct answer from the following (0.5 × 15 = 7.5)

1. A matrix $A = (a_{ij})_{m \times n}$ is said to be rectangular if

- (a) $m = n$ (b) $m \neq n$ (c) $m = p$ (d) $m = r$

2. The property of a matrix with each of its non-diagonal element zero is

- (a) Identity matrix (b) Singular matrix
(c) Triangular matrix (d) Diagonal matrix

3. If $A = \begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}$, then $\text{adj. } A$ is equal to

- (a) $\begin{bmatrix} 1 & -2 \\ -2 & 1 \end{bmatrix}$ (b) $\begin{bmatrix} 2 & 1 \\ 1 & 1 \end{bmatrix}$
(c) $\begin{bmatrix} 1 & -2 \\ -2 & -1 \end{bmatrix}$ (d) $\begin{bmatrix} -1 & 2 \\ 2 & -1 \end{bmatrix}$

4. What is the value of M_{11} for the given matrix

$$\begin{bmatrix} 1 & 5 \\ 4 & -7 \end{bmatrix}$$

- (a) -7 (b) 0 (c) -4 (d) 7

5. If A and B are matrices of the same order, then $AB' - BA'$ is a

- (a) Skew symmetric matrix
(b) Null matrix
(c) Symmetric matrix
(d) Unit matrix

6. What is the derivative of x^n

- (a) nx^n (b) nx^{n-1} (c) nx^{n-2} (d) n

7. Find the derivative of $y = 7$ w.r.t. x

- (a) 0 (b) 1 (c) 7 (d) $7x$

3. Using matrix inversion method, solve the system of equation (5)

$$5x + 7y + 2 = 0$$

$$4x + 6y + 3 = 0$$

OR

4(a). Differentiate $(ax + b)^m$ (2)

(b). Integrate $\int xe^x dx$ by parts. (3)

5. Define partial derivatives. For the function $f(x, y) = x^2y + 4xy^2$, find the partial derivatives

$$\frac{\partial f}{\partial x} \text{ and } \frac{\partial f}{\partial y}. \quad (5)$$

OR

6. Evaluate $\int (4x + 5)^6 dx$ by substitution method. (5)

7. A machine with useful life of seven years cost 10,000 while another with useful life of five years cost 8000. The first machine saves labour expenses of 1900 annually and the second one saves 2200. Determine the preferred course of action. Assume cost of borrowing at 10% compounded per annum. (5)

OR

8. Find the maxima and minima value of (5)

$$5x^2 - 20x + 25x - 30$$

9. Explain brief depreciation of assets. (5)

OR

10(a). What is perpetuity? (2)

(b). Calculate the compound value of 10,000 at the end of three years at 12% rate of interest, when interest is calculated on (3)

(i) yearly basis

(ii) quarterly basis
