MATHS

BOOKS - JEEVITH PUBLICATIONS MATHS (KANNADA ENGLISH)

MATRICES

One Marks Questions With Answers

1. Define a diagonal matrix.

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2. Define a scalar matrix.

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3. Define a unit matrix.

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4. Define a symmetric matrix.

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5. Define a skew-symmetric matrix.

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6. Construct a 2×3 whose elements are given by $a_{ij} = |i - j|$.

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7. Construct a 3×2 matrix whose elements are given by $a_{ij} = \frac{1}{2}|i - 3j|$.

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8. In a matrix write.

(i) the order of the matrix (ii) the number of elements,

(iii) write the elemeats $a_{13}, a_{21}, a_{33}, a_{24}, a_{23}$.

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9. Construct a 2×2 matrix, $A = \left[a_{ij}\right]$, whose elements are given by:

(i) $a_{ij} = \dfrac{(i+j)^2}{2}$

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10. Construct a 2×2 matrix, $A = [a_{ij}]$, whose elements are given by:

(ii) $a_{ij} = \frac{i}{j}$.

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11. Construct a 2×2 matrix, $A = [a_{ij}]$, whose elements are given by:

(iii) $a_{ij} = \frac{(i+2j)^2}{2}$.

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12. What is the number of the possible square matrices for order 2 with each entry 0 or 1.

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13. If a matrix has 18 elements what are the possible orders it can have?

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14. If a matrix has 5 elements what are the possilbe orders it can have?

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15. Find the transpose of the matrix: $\begin{bmatrix} 5 \\ \frac{1}{2} \\ -1 \end{bmatrix}$

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16. Construct a 2×3 whose elements are given by $a_{ij} = |i - j|$.

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17. What is the number of the possible square matrices for order 3 with each entry 0 or 1.

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18. Construct a 2×2 matrix $A = |a_{ij}|$ whose elements are given by $a_{ij} = 2i + j$.

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19. Construct a 2×2 matrix, $A = [a_{ij}]$, whose elements are given by:

(iii) $a_{ij} = \frac{(i + 2j)^2}{2}$.

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Three Marks Questions With Answers

1. Find the value of a,b,c and d from the equation:

$$\begin{bmatrix} a-b & 2a+c \\ 2a-b & 3c+d \end{bmatrix} = \begin{bmatrix} -1 & 5 \\ 0 & 13 \end{bmatrix}$$

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2. Simplify :

$$\cos\theta \begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix} = \sin\theta \begin{bmatrix} \sin\theta & -\cos\theta \\ \cos\theta & \sin\theta \end{bmatrix}$$

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3. Find X and Y if (i)

$$X+Y = \begin{bmatrix} 7 & 0 \\ 2 & 5 \end{bmatrix} \text{ and } X-Y = \begin{bmatrix} 3 & 0 \\ 3 & 3 \end{bmatrix}$$

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4. Find X and Y if (ii)

$$2X + 3Y = \begin{bmatrix} 2 & 3 \\ 4 & 0 \end{bmatrix} \text{ and } 3X + 2Y = \begin{bmatrix} 2 & -2 \\ -1 & 5 \end{bmatrix}$$

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5. Express $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ as sum of a symmetric and skew symmetric matrices.

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6. By using the elementary transformation, find the inverse of the following metrices.

(ii) $\begin{bmatrix} 2 & 3 \\ 5 & 7 \end{bmatrix}$.

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7. By using the elementary transformation, find the inverse of the following metrices.

(ii) $\begin{bmatrix} 2 & 3 \\ 5 & 7 \end{bmatrix}$.

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8. If $A = \begin{bmatrix} -2 \\ 4 \\ 5 \end{bmatrix}, B = [1, 3, -6]$, verify that $(AB)'B'A'$.

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9. By using the elementary transformation, find the inverse of the matrix, $A = \begin{bmatrix} 1 & 2 \\ 2 & -1 \end{bmatrix}$.

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10. If A and B are square matrices of the same order, then show that $(AB)^{-1} = B^{-1}A^{-1}$.

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11. Epress matrix $A = \begin{bmatrix} 1 & 2 \\ 2 & -1 \end{bmatrix}$ as the sum of a symmetric and skew-symmetric matrix.

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12. Find the value of x and y in $\begin{bmatrix} x+2y & 2 \\ 4 & x+y \end{bmatrix} - \begin{bmatrix} 3 & 2 \\ 4 & 1 \end{bmatrix} = 0$ where 0 is a null matrix.

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13. Find the value of x and y : $\begin{bmatrix} x+y & 3 \\ x-y & -6 \end{bmatrix} = \begin{bmatrix} 2 & 3 \\ 4 & -6 \end{bmatrix}$

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14. For any square matrix A with real numbers, prove that $A + A'$ is a symmetric and $A - A'$ is a skew symmetric.

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15. If $\begin{bmatrix} 3 & -2 \\ 4 & -2 \end{bmatrix}$, find k so that $A^2 = kA - 2I$.

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16. A trust fund has Rs. 30,000 that must be invested in two different types of bonds. The first bond pays 5% interest per year, and the second bond pays 7% interest

per year. Using matix multiplication, determine how to divide Rs. 30,000 among the two types of bonds. If the trust fund must obtain an annual total interest of Rs. 1800.

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Five Marks Questions With Answers

1. If $f(x) = \begin{bmatrix} \cos\theta & -\sin\theta & 0 \\ \sin x & \cos x & 0 \\ 0 & 0 & 1 \end{bmatrix}$, show that $F(x)F(y) = F(x+y)$.

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2. Find $A^2 - 5A + 6I$ if $A = \begin{bmatrix} 2 & 0 & 1 \\ 2 & 1 & 3 \\ 1 & -1 & 0 \end{bmatrix}$.

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3. If $A = \begin{bmatrix} 1 & 0 & 2 \\ 0 & 2 & 1 \\ 2 & 0 & 3 \end{bmatrix}$, prove that $A^3 - 6A^2 + 7A + 2I = 0$.

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4. If $A = \begin{bmatrix} 1 & -1 \\ 2 & 3 \end{bmatrix}, B = \begin{bmatrix} 1 & 3 \\ -1 & 4 \end{bmatrix}$ and $C = \begin{bmatrix} 2 & -2 \\ 3 & 0 \end{bmatrix}$ verify that $A(BC) = (AB)C$.

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5. If $A' = \begin{bmatrix} 2 & 5 \\ 2 & 1 \\ -3 & 2 \end{bmatrix}, B = \begin{bmatrix} 2 & -1 & -2 \\ 4 & 0 & 5 \end{bmatrix}$ and $\begin{bmatrix} 4 & 5 & 2 \\ 0 & 1 & 4 \end{bmatrix}$ find $A + B$ and $B - C$, show that $A + (B - C) = (A + B) - C$.

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6. If $A = \begin{bmatrix} 0 & 6 & 7 \\ -6 & 0 & 8 \\ 7 & -8 & 0 \end{bmatrix}, B = \begin{bmatrix} 0 & 1 & 1 \\ 1 & 0 & 2 \\ 1 & 2 & 0 \end{bmatrix}, C = \begin{bmatrix} 2 \\ -2 \\ 3 \end{bmatrix}$

calculate AC, BC and (A+B)C.

Also verify (A+B)C=AC+BC

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7. If $A = \begin{bmatrix} -2 \\ 4 \\ 5 \end{bmatrix}, B = [1, 3, -6]$, verify that $(AB)'B'A'$.

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8. If $A = \begin{bmatrix} 2 & 0 & 1 \\ 0 & -3 & 0 \\ 0 & 0 & 4 \end{bmatrix}$, verify $A^3 - 3A^2 - 10A + 24I = 0$ where 0 is zero matrix of order 3×3.

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Try Yourself

1. Construct a 3×4 matrix, $A = [a_{ij}]$ whose elements are given by: (i) $a_{ij} = \frac{1}{2}|-3i + j|$

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2. Construct a 3×4 matrix, $A = [a_{ij}]$ whose elements are given by: (ii) $a_{ij} = 2i - j$

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3. By using the elementary transformation, find the inverse of the matrix, $A = \begin{bmatrix} 1 & 2 \\ 2 & -1 \end{bmatrix}$.

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4. If a matrix has 8 elements. What are the possible orders it can have?

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5. Define a row matrix.

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6. Define a column matrix.

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7. If $A = \begin{bmatrix} 2 & 2 \\ 1 & 3 \end{bmatrix}, B = \begin{bmatrix} 2 & 0 \\ 4 & 3 \end{bmatrix}$ and $C = \begin{bmatrix} 1 & 4 \\ 1 & 3 \end{bmatrix}$.

Calculate AB, AC and A (B + C). Verify that

$AB + AC = A(B + C)$.

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8. If

$A = \begin{bmatrix} 4 & -1 \\ 0 & 3 \end{bmatrix}, B = \begin{bmatrix} 1 & 2 \\ -1 & 3 \end{bmatrix}$ and $C = \begin{bmatrix} 1 & -2 \\ 3 & 5 \end{bmatrix}$

verify that $A(BC) = (AB)C$.

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9. If

$$A' = \begin{bmatrix} 2 & 5 \\ 2 & 1 \\ -3 & 2 \end{bmatrix}, B = \begin{bmatrix} 2 & -1 & -2 \\ 4 & 0 & 5 \end{bmatrix} \text{ and } \begin{bmatrix} 4 & 5 & 2 \\ 0 & 1 & 4 \end{bmatrix}$$

find $A + B$ and $B - C$, show that

$A + (B - C) = (A + B) - C.$

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10. If

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 0 & 4 & 3 \\ 2 & 4 & 5 \end{bmatrix}, B = \begin{bmatrix} 2 & 3 & 4 \\ -3 & -1 & 2 \\ 1 & 6 & 0 \end{bmatrix}, C = \begin{bmatrix} 2 \\ 7 \\ 0 \end{bmatrix}$$

Calculate AC, BC and $(A + B)C = AC + BC.$

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