Chapter- 03

Matrices

1 Mark Questions:

01. If the matrix $A=\begin{pmatrix} 2 & -2 \\ -2 & 2 \end{pmatrix}$ and $A^2 = pA$, then write the value of 'p'.

02. Matrix $A=\begin{bmatrix} 0 & 2b & -2 \\ 3 & 1 & 3 \\ 3a & 3 & -1 \end{bmatrix}$ is given to be symmetric, find the value of 'a' and 'b'.

03. If $\begin{bmatrix} 3 & 4 \\ 2 & x \end{bmatrix}\begin{bmatrix} x \\ 1 \end{bmatrix}=\begin{bmatrix} 19 \\ 15 \end{bmatrix}$, find the value of x.

04. Write the element a_{12} of the matrix $A=\left(a_{ij}\right)_{2\times 2}$, whose elements are given by $a_{ij}=e^{2ij}.\sin jx$.

05. If $\begin{bmatrix} 3y-x & -2x \\ 3 & 7 \end{bmatrix}=\begin{bmatrix} 5 & -2 \\ 3 & 7 \end{bmatrix}$, then find y.

06. Find x and y, if $2\begin{bmatrix} 1 & 3 \\ 0 & x \end{bmatrix}+\begin{bmatrix} y & 0 \\ 1 & 2 \end{bmatrix}=\begin{bmatrix} 5 & 6 \\ 1 & 8 \end{bmatrix}$

07. If A is a square matrix and, then find the value of, where is the transpose of matrix A

4 Marks Questions:

8. Express the following matrix as a sum of a symmetric and a skew-symmetric matrix and verify your result; $\begin{bmatrix} 3 & -2 & -4 \\ 3 & -2 & -5 \\ -1 & 1 & 2 \end{bmatrix}$.

9. For what value of 'a' and 'b' are the matrics $A=\begin{bmatrix} 2b & 0 \\ 2a+1 & b^2-5b \end{bmatrix} and \begin{bmatrix} b^2+1 & 0 \\ a+3 & -6 \end{bmatrix}$ equal?

10. If $A=\begin{bmatrix} 1 & 0 & 2 \\ 0 & 2 & 1 \\ 2 & 0 & 3 \end{bmatrix} and\ A^2-6A^2+7A+kI_3=0$ find k.

11. If $A=\begin{pmatrix}1 & 2\\ 3 & 1\end{pmatrix} and\ B=\begin{pmatrix}1 & -1 & 2\\ 3 & 2 & -3\end{pmatrix}$ verify that $(AB)^T = B^T A^T$

12. Let $A=\begin{pmatrix}2 & 3\\ -1 & 2\end{pmatrix}$, then show that $A^2-4A+7I=0$. Using the result calculate A^5.

6 Marks Questions:

13. Using elementary transformation, find the inverse of following matrices $\begin{pmatrix}2 & -1 & 3\\ -5 & 3 & 1\\ -3 & 2 & 3\end{pmatrix}$

14. A school wants to award its student for the values of Honesty. Regularity and Hard work with a total cash award of Rs.6,000. Three times the award money for Hard work added to that given for honesty amounts to Rs.11,000. The award money given for Honesty and Hard work together is double the one given for Regularity. Represent the above situation algebraically and find the award money for each value, using the matrix method. Apart from these values, namely. Honesty, Regularity, and Hard work suggest one more value which the school must include for awards.

15. The management committee of a residential colony decided to award some of its members (say x) for honesty, some (say y) for helping others, and some others (say z) for supervising the workers to keep the colony neat and clean. The sum of all the awardees is 12. Three times the sum of awardees for cooperation and supervision added to two times the number of awardees for honesty is 33. If the sum of the number of awardees for honesty and supervision is twice the number of awardees for helping others, using a matrix method, find the number of awardees of each category. Apart from these values, namely, honesty, cooperation, and supervision suggest one more value which the management of the colony must include for awards.

16. Use the product $\begin{bmatrix}1 & -1 & 2\\ 0 & 2 & -3\\ 3 & -2 & 4\end{bmatrix}\begin{bmatrix}-2 & 0 & 1\\ 9 & 2 & -3\\ 6 & 1 & -2\end{bmatrix}$ to solve the system of equations

$x-y+2z-1;\ 2y-3z=1;\ 3x-2y+4z=2$

17. If $A=\begin{bmatrix}1 & 1 & 1\\ 1 & 2 & -3\\ 2 & -1 & 3\end{bmatrix}$ find A^{-1} using A^{-1} solve $x+y+2z=0;\ x+2y-z=9;\ x-3y+3z=-14$

18. 10 students were selected from a school-based on values for giving awards and were divided into three groups. The first group comprises hard workers, the second group has honest and law-abiding students and the third group contains vigilant and obedient students. Double the number of students of the first group added to the number in the second group gives 13, while the combined strength of the first and second group is four times that of the third group. Using the matrix method, find the number of students in each group. Apart from the values, hard work, honesty, and respect for law, vigilance, and obedience, suggest one more value, which in your opinion, the school should consider for awards. ***[CBSE (F) 2013]***

19. A trust caring for handicapped children gets Rs.30,000 every month from its donors. The trust spends half of the funds received for medical and educational care of the children and for that it charges 2% of the spent amount from them, and deposits the balance amount in a private bank to get the money multiplied so that in future the trust goes on functioning regularly. What percent of interest should the trust get from the bank to get a total of Rs 1,800 every month?

Use the matrix method, to find the rate of interest. Do you think people should donate to such trusts?

20. On her Birthday, Seema decided to donate some money to Children of an orphanage home. If there were 8 children less, everyone would have got Rs. 10 more. However, if there were 16 children more, everyone would have got Rs. 10 less. Using the matrix method, find the number of children and the amount distributed by Seema. What values are reflected by Seema's decision?