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HOLIDAY HOMEWORK. - 2017-18.

XII - MATHEMATICS.

ONE MARK QUESTIONS.

1. Write the element a_{23} of a 3×3 matrix $A = (a_{ij})$ whose elements a_{ij} are given by $a_{ij} = \frac{|i-j|}{2}$.
2. Find the number of all possible matrices of order 3×3 with each entry 0 or 1.
3. If $\begin{bmatrix} 2x & 4 \end{bmatrix}\begin{bmatrix} x \\ -8 \end{bmatrix} = 0$, find the possible value of x.
4. Find (adj A), if $A = \begin{bmatrix} 5 & 2 \\ 7 & 3 \end{bmatrix}$.
5. If $\begin{bmatrix} xy & 4 \\ z+6 & x+y \end{bmatrix} = \begin{bmatrix} 8 & w \\ 0 & 6 \end{bmatrix}$, write the value of $(x+y+z)$.
6. If for any 2×2 square matrix A, $A(\text{adj }A) = \begin{bmatrix} 8 & 0 \\ 0 & 8 \end{bmatrix}$, then write the value of $|A|$.
7. If $\begin{vmatrix} 3x & 7 \\ -2 & 4 \end{vmatrix} = \begin{vmatrix} 8 & 7 \\ 6 & 4 \end{vmatrix}$, find the value of x.
8. Let A be a non-singular square matrix of order 3×3. If $|A| = 5$, then find $|\text{adj }A|$.
9. Write the value of $\begin{vmatrix} a+ib & c+id \\ -c+id & a-ib \end{vmatrix}$.
10. If A and B are square matrices of order 3 such that $|A| = -1$, $|B| = 3$, then find the value of $|3AB|$.

TWO MARK QUESTIONS.

11. If A and B are two matrices of order $3\times m$ and $3\times n$ respectively and $m = n$, then find the order of $5A - 2B$.

12. Find the minors and cofactors of the elements a_{11} and a_{21} in the determinant $\begin{vmatrix} 2 & -3 & 5 \\ 6 & 0 & 4 \\ 1 & 5 & -7 \end{vmatrix}$

13. For what Value of x, the given matrix $A = \begin{bmatrix} 3-2x & x+1 \\ 2 & 4 \end{bmatrix}$ is a singular matrix?

14. If A is a square matrix of order 3 such that $|\text{adj } A| = 64$, find $|A|$.

15. If $2\begin{bmatrix} 1 & 3 \\ 0 & x \end{bmatrix} + \begin{bmatrix} y & 0 \\ 1 & 2 \end{bmatrix} = \begin{bmatrix} 5 & 6 \\ 1 & 8 \end{bmatrix}$, then write the Value of $(x+y)$.

16. For what Value of x, is the matrix $A = \begin{bmatrix} 0 & 1 & -2 \\ -1 & 0 & 3 \\ x & -3 & 0 \end{bmatrix}$ a skew-symmetric matrix?

17. If matrix $A = \begin{bmatrix} 1 & -1 \\ -1 & 1 \end{bmatrix}$ and $A^2 = kA$, Then write the Value of k.

18. If A is an invertible matrix of order 2 & $|A| = 4$, then find $\det(A^{-1})$.

19. If a, b, c are in A.P., then evaluate $\begin{vmatrix} x+2 & x+3 & x+2a \\ x+3 & x+4 & x+2b \\ x+4 & x+5 & x+2c \end{vmatrix}$

20. Find the area of the triangle whose vertices are $(-2,4)$, $(2,-6)$ and $(5,4)$.

FOUR MARK QUESTIONS.

21. Using Properties of determinants, Prove that

$$\begin{vmatrix} -a^2 & ab & ac \\ ba & -b^2 & bc \\ ca & cb & -c^2 \end{vmatrix} = 4a^2b^2c^2.$$

22. Using properties of determinants, Prove the following:

$$\begin{vmatrix} a & b & c \\ a^2 & b^2 & c^2 \\ bc & ca & ab \end{vmatrix} = (a-b)(b-c)(c-a)(ab+bc+ca).$$

23. Prove that the determinant $\begin{vmatrix} x & \sin\theta & \cos\theta \\ -\sin\theta & -x & 1 \\ \cos\theta & 1 & x \end{vmatrix}$ is independent of θ.

24. Using the Property of determinants and without expanding Prove that $\begin{vmatrix} b+c & q+r & y+z \\ c+a & r+p & z+x \\ a+b & p+q & x+y \end{vmatrix} = 2\begin{vmatrix} a & p & x \\ b & q & y \\ c & r & z \end{vmatrix}$

25. Using the property of determinants and without expanding evaluate the determinant $\Delta = \begin{vmatrix} 265 & 240 & 219 \\ 240 & 225 & 198 \\ 219 & 198 & 181 \end{vmatrix}$

26. Let $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$, Show that $A^2 - 5A + 7I = 0$. Hence find A^{-1}.

27. Let $A = \begin{bmatrix} 3 & 7 \\ 2 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} 6 & 8 \\ 7 & 9 \end{bmatrix}$. Verify that $(AB)^{-1} = B^{-1}A^{-1}$.

28. Express the matrix $A = \begin{bmatrix} 3 & 2 & 3 \\ 4 & 5 & 3 \\ 2 & 4 & 5 \end{bmatrix}$ as the sum of a symmetric and a Skew - symmetric matrix.

29. Find the matrix X so that $X\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix} = \begin{bmatrix} -7 & -8 & -9 \\ 2 & 4 & 6 \end{bmatrix}$

30. Three shopkeepers A, B and C go to a store to buy stationary. A Purchases 12 dozen notebooks, 5 dozen pens and 6 dozen pencils. B Purchases 10 dozen notebooks, 6 dozen pens and 7 dozen Pencils. C Purchases 4 dozen notebooks, 13 dozen Pens and 8 dozen ... costs 40 paise a pen costs ₹ 1.25

and a pencil costs 35 paise. Use matrix multiplication to calculate each individual's bill.

SIX MARK QUESTIONS.

31. If $A = \begin{bmatrix} 2 & -3 & 5 \\ 3 & 2 & -4 \\ 1 & 1 & -2 \end{bmatrix}$, find A^{-1} and hence solve the system of equations

$$2x - 3y + 5z = 11$$
$$3x + 2y - 4z = -5$$
$$x + y - 2z = -3.$$

32. Solve the system of the following equations, by matrix method.

$$\frac{2}{x} + \frac{3}{y} + \frac{10}{z} = 4.$$
$$\frac{4}{x} - \frac{6}{y} + \frac{5}{z} = 1.$$
$$\frac{6}{x} + \frac{9}{y} - \frac{20}{z} = 2.$$

33. By using properties of determinants, show that

$$\begin{vmatrix} x & x^2 & yz \\ y & y^2 & zx \\ z & z^2 & xy \end{vmatrix} = (x-y)(y-z)(z-x)(xy+yz+zx).$$

34. If $A = \begin{bmatrix} 1 & -1 & 0 \\ 2 & 3 & 4 \\ 0 & 1 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 2 & -4 \\ -4 & 2 & -4 \\ 2 & -1 & 5 \end{bmatrix}$ are two square matrices, find AB and hence solve the system of linear equations $\cancel{2x-3}$

$$x - y = 3$$
$$2x + 3y + 4z = 17$$
$$y + 2z = 7.$$

35. If $A = \begin{bmatrix} 1 & -1 & 1 \\ 2 & +1 & -3 \\ 1 & 1 & 1 \end{bmatrix}$, find A^{-1} and hence solve the system of linear equations

$$x + 2y + z = 4,$$
$$-x + y + z = 0$$
$$x - 3y + z = 2.$$