Red Rose Senior Secondary School

Class XII

Subject: MATHS

Chapter: 4 (DETERMINANTS)

1. If $A = \begin{bmatrix} 3 & -2 \\ 4 & -2 \end{bmatrix}$ find the value of λ so that $A^2 = \lambda A - 2I$ hence find A^{-1}

(4) [2007]

2. Using the properties of determinant, prove that ***(4) [2007]***

$$\begin{vmatrix} x+4 & 2x & 2x \\ 2x & x+4 & 2x \\ 2x & 2x & x+4 \end{vmatrix} = (5x+4)(4-x)^2$$

3. Using matrices solve the following system of equation: ***(6) [2007]***

2x-y+z=2
3x-z =2
x+2y =3

4. For the what value of x, is the following matrix is singular ***(1) [2008]***

$$\begin{bmatrix} \mathbf{3-2x} & \mathbf{x+1} \\ \mathbf{2} & \mathbf{4} \end{bmatrix}$$

5. Evaluate: ***(1) [2008]***

$$\begin{vmatrix} \sin 30^\circ & \cos 30^\circ \\ -\sin 60^\circ & \cos 60^\circ \end{vmatrix}$$

6. A Matrix A of order 3 x 3, has determinants 4. Find the value of |3A|.

(1) [2008]

7. Using Properties of determinants prove the following: ***(4) [2008]***

$$\begin{vmatrix} a^2+1 & ab & ac \\ ab & b^2+1 & bc \\ ca & cb & c^2+1 \end{vmatrix} = 1 + a^2 + b^2 + c^2$$

OR

If x, y, z are different and $\begin{vmatrix} x & x^2 & 1+x^3 \\ y & y^2 & 1+y^3 \\ z & z^2 & 1+z^3 \end{vmatrix} = 0$, show that xyz= -1.

8. using matrices, solve the following system of linear equation: ***(6) [2008]***

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

9. Find the value of x from the following: ***(1) [2009]***

$$\begin{vmatrix} x & 4 \\ 2 & 2x \end{vmatrix} = 0$$

10. Write the value of following determinants ***(1) [2009]***

$$\begin{vmatrix} a-b & b-c & c-a \\ b-c & c-a & a-b \\ c-a & a-b & b-c \end{vmatrix}$$

11. using properties of Determinants prove that following: ***(4) [2009]***

$$\begin{vmatrix} 1+x & 1 & 1 \\ 1 & 1+y & 1 \\ 1 & 1 & 1+z \end{vmatrix} = xyz + xy + yz + zx$$

OR

Using properties of determinants prove the following:

$$\begin{vmatrix} x+y & x & x \\ 5x+4y & 4x & 2x \\ 10x+8y & 8x & 3x \end{vmatrix} = x^3$$

12. using matrices, solve the following system of equation: ***(6) [2009]***

$$x + y + z = 6$$
$$x + 2z = 7$$
$$3x + y + z = 12$$

13. What positive value of x makes the following pair of Determinants equal? ***(1) [2010]***

$$\begin{vmatrix} 2x & 3 \\ 5 & x \end{vmatrix} , \quad \begin{vmatrix} 16 & 3 \\ 5 & 2 \end{vmatrix}$$

14. A is a square matrix of order 3 and $|A| = 7$. Write the value of $|\text{Adj. } A|$.

(1) [2010]

15. write tha adjoint of following matrix : ***(1) [2010]***

$$\begin{bmatrix} 2 & -1 \\ 4 & 3 \end{bmatrix}$$

16. using matrices, solve the following system of equation: ***(6) [2010]***

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

OR

If a, b, c is positive and unequal, show that the following determinants is negative:

$$\Delta = \begin{vmatrix} a & b & c \\ b & c & a \\ c & a & b \end{vmatrix}$$

OR

Using properties of determinants, prove the following:

$$\begin{vmatrix} x & x^2 & 1+px^3 \\ y & y^2 & 1+py^3 \\ z & z^2 & 1+pz^3 \end{vmatrix} = (1+pxyz)(x-y)(y-z)(z-x)$$

17. **Evaluate:** ***(1) [2011]***

$$\begin{vmatrix} \cos 15^\circ & \sin 15^\circ \\ \sin 75^\circ & \cos 75^\circ \end{vmatrix}$$

18. using properties of Determinants, solve that following for x : ***(4) [2011]***

$$\begin{vmatrix} x+a & x & x \\ x & x+a & x \\ x & x & x+a \end{vmatrix} = 0$$

19. using matrices, solve the following system of equation: ***(6) [2011]***

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

20. Let A be a square matrix of order 3 x 3. Write the value of |2A|, Where |A| = 4. ***(1) [2012]***

21. using properties of Determinants, Show that ***(4) [2012]***

$$\begin{vmatrix} b+c & a & a \\ b & c+a & b \\ c & c & a+b \end{vmatrix} = 4\,abc$$

22. using matrices, solve the following system of equation: ***(6) [2012]***

3x + 4y +7z = 4
2x-y + 3z = -3
x +2y -3z = 8

OR

Using matrices, solve the following system of equation:

x+y-z=3; 2x+3y+z=10; 3x-y-7z=1

23. - If A_{ij} is the cofactor of the element a_{ij} of the determinant: ***(1) [2013]***

$$\begin{vmatrix} 2 & -3 & 5 \\ 6 & 0 & 4 \\ 1 & 5 & -7 \end{vmatrix}$$ then write the value of $a_{32} . A_{32}$

24. Using properties of Determinants solve that following: ***(4) [2013]***

$$\begin{vmatrix} 3x & -x+y & -x+z \\ x-y & 3y & z-y \\ x-z & y-z & 3z \end{vmatrix} = 3(x+y+z)(xy+yz+zx)$$

OR

Using properties of Determinants solve that following:

$$\begin{vmatrix} x & x+y & x+2y \\ x+2y & x & x+y \\ x+y & x+2y & x \end{vmatrix} = 9y^2(x+y)$$

25. The management committee of a residential colony decided to award some of the members (Say x) for honesty, some (Say y) for helping others and some others (Say Z) for supervision the workers to keep the colony neat and clean. The sum of all the awardees is 12. Three times 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 matrix method, find the number of awardees of each category. A part from these values namely, honesty, cooperation and supervision suggest one more value which the management of the colony must include for awards. ***(6) [2013]***

26. if $\begin{vmatrix} 3x & 7 \\ -2 & 4 \end{vmatrix} = \begin{vmatrix} 8 & 7 \\ 6 & 4 \end{vmatrix}$ **, find the value of x.** ***(1) [2014]***

27. Using properties of Determinants solve that following: ***(4) [2014]***

$$\begin{vmatrix} x+y & x & x \\ 5x+4y & 4x & 2x \\ 10x+8y & 8x & 3x \end{vmatrix} = x^3$$

28. Two schools A and b wants to award their selected students on the values of sincerity, truthfulness and helpfulness. The school A wants to award of rupees x each, rupees y each and rupees z each for there respective value to 3,2 and 1 students respectively with a total award money of rupees 1600. School B wants to be spend of rupees 2300 to award its 4, 1 and 3 students on the respective values (by giving the same award money to the three values as before). If the total amount of award for one prize on each value is of rupees 900, using matrices, find the award money for each value. Apart from these three values, suggest one more value which should be considered for award. ***(6) [2014]***

29. Write the value of ***(1) [2015]***

$$\mathbf{\Delta} = \begin{vmatrix} \mathbf{x+y} & \mathbf{y+z} & \mathbf{z+x} \\ \mathbf{z} & \mathbf{x} & \mathbf{y} \\ \mathbf{-3} & \mathbf{-3} & \mathbf{-3} \end{vmatrix}$$

30. Find the adjoint of matrix $A = \begin{bmatrix} -1 & -2 & -2 \\ 2 & 1 & -2 \\ 2 & -2 & 1 \end{bmatrix}$ and hence show that

A.(adj A) = $|A|I_3$ ***(4) [2015]***

31. Using properties of Determinants solve that following: ***(4) [2015]***

$$\begin{vmatrix} a^2 & bc & ac+c^2 \\ a^2+ab & b^2 & ac \\ ab & b^2+bc & c^2 \end{vmatrix} = 4a^2b^2c^2$$

32. In the interval π/2 < x < π, find the value of x for which the matrix

$\begin{bmatrix} 2\,sin\,x & 3 \\ 1 & 2\,sin\,x \end{bmatrix}$ is singular ***(1) [2015 comptt.]***

33. $A = \begin{bmatrix} 2 & 3 \\ 1 & -4 \end{bmatrix}, B = \begin{bmatrix} 1 & -2 \\ -1 & 3 \end{bmatrix}$ veryfy that $(AB)^{-1} = B^{-1}A^{-1}$

(4) [2015 comptt.]

34. Using properties of Determinants, solve for x: ***(4) [2015 comptt.]***

$$\begin{vmatrix} a+x & a-x & a-x \\ a-x & a+x & a-x \\ a-x & a-x & a+x \end{vmatrix} = 0$$

35. if x € N & $\begin{vmatrix} x+3 & -2 \\ -3x & 2x \end{vmatrix} = 8$, then find the value of x. ***(1) [2016]***

37. Using properties of Determinants, show that ΔABC is isosceles ***(6) [2016]***

$$\begin{vmatrix} 1 & 1 & 1 \\ 1+\cos A & 1+\cos B & 1+\cos C \\ \cos^2 A+\cos A & \cos^2 B+\text{Cos}B & \cos^2 C+\cos C \end{vmatrix} = 0$$

OR

A shopkeeper has three varieties of pen s A, B, and C , Menu Purchased 1 Pen of each Variety for a total of Rs 21. Jeevan Purchased 4 pens of A variety, 3 Pens of B variety and 2 pens of c variety for Rs 60. While Sikha purchased 6 pens of A variety, 2 Pens of B variety And 3 Pens of c Variety for Rs. 70.

Using matrix method, Find Cost of Each variety of pen.

38. If for any 2x2 square matrix A,$A(adjA) = \begin{bmatrix} 8 & 0 \\ 0 & 8 \end{bmatrix}$,then wrrite the value of $|A|$. **1(2017)**

39. If A is the skew symmetric matrix of order 3,then prove that $detA = 0$.
2(2017)

40. Determine the product $\begin{bmatrix} -4 & 4 & 4 \\ -7 & 1 & 3 \\ 5 & -3 & -1 \end{bmatrix} \begin{bmatrix} 1 & -1 & 1 \\ 1 & -2 & -2 \\ 2 & 1 & 3 \end{bmatrix}$ and use it to solve the system of equation $x - y + z = 4, x - 2y - 2z = 9\ and\ 2x + y + 3y = 1.$

6 (2017)

41. If A is an invertible matrix of order 2 and $\det(A) = 4$, then write the value of $\det(A^{-1})$. **1 (comp.2017)**

42. A school wants to award its students for rregularity and hardwork with a total cash awarrd of Rs. 6,000. If three times the award money for hardwork added to that given for regularity amounts to Rs. 11,000,represent the above situation algebraically and find he award money for each value, using

matrix. Sugest wo mor value, which the school must include for award. **4 (comp.2017)**

43. If $a+b+c \neq 0$ and $\begin{vmatrix} a & b & c \\ b & c & a \\ c & a & b \end{vmatrix} = 0$, then using properties of determinants,prove that $a = b = c$. **(4)** **(comp.2017)**

44. using properties of determinant,prove that

$$\begin{vmatrix} 1 & 1 & 1+3x \\ 1+3y & 1 & 1 \\ 1 & 1+3z & 1 \end{vmatrix} = 9(3xyz + xy + yz + zx).$$ **4 (2018)**

45. if A is square matrix satisfying $AA' = I$,write the value of$|A|$. **1 [2019]**

46. Using properties of determinant,prove that

$$\begin{vmatrix} 3a & -a+b & -a+c \\ -b+a & 3b & -b+c \\ -c+b & -c+b & 3c \end{vmatrix} = 3(a+b+c)(ab+bc+ca).$$ **4 [2019]**

47. If $A = \begin{bmatrix} 1 & 3 & 4 \\ 2 & 1 & 2 \\ 5 & 1 & 1 \end{bmatrix}$,find A^{-1}.

Hence solve the system of equations **6 [2019]**

$$x + 3y + 4z = 8$$

$$2x + y + 2z = 5$$

$$5x + y + z = 7.$$

48. find $|AB|$, if $A = \begin{bmatrix} 0 & -1 \\ 0 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & 5 \\ 0 & 0 \end{bmatrix}$.

49. If $A = \begin{bmatrix} p & 2 \\ 2 & p \end{bmatrix}$ and $|A^3| = 125$, then find the value of p. **2 [2019]**

50. If A is a square matrix satisfying $AA' = I$, write the value of $|A|$. **1 [2019]**

51. Using matrices, solve the following system of equation: ***(6) [2019]***

$$3x - 2y + 3z = 8$$
$$2x + y - z = 1$$
$$4x - 3y + 2z = 4$$

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