DAV PUBLIC SCHOOL, UNIT-VIII

SUB-MATHEMATICS

CHAPTER:-DETERMINANTS

WORKSHEET (STANDARD)

CLASS:-XII

SECTION - B

1. Let A be an invertible symmetric matrix, prove that $\left(A^{-1}\right)^{T} = A^{-1}$.

2. Without expanding , show that : $\Delta = \begin{vmatrix} \operatorname{cosec}^2\theta & \cot^2\theta & 1 \\ \cot^2\theta & \operatorname{cosec}^2\theta & -1 \\ 42 & 40 & 2 \end{vmatrix} = 0$.

3. Prove that $\begin{vmatrix} 1 & a & a^2 \\ a^2 & 1 & a \\ a & a^2 & 1 \end{vmatrix} = \left(1-a^3\right)^2$.

4. If $\cos 2\theta = 0$, find $\begin{vmatrix} 0 & \cos\theta & \sin\theta \\ \cos\theta & \sin\theta & 0 \\ \sin\theta & 0 & \cos\theta \end{vmatrix}^2$.

5. If x= -9 is a root of $\begin{vmatrix} x & 3 & 7 \\ 2 & x & 2 \\ 7 & 6 & x \end{vmatrix} = 0$, then find other two roots .

6. Prove that $\begin{vmatrix} a & a+b & a+b+c \\ 2a & 3a+2b & 4a+3b+2c \\ 3a & 6a+3b & 10a+6b+3c \end{vmatrix} = a^3$

SECTION - C

7. Show that $\begin{vmatrix} (b+c)^2 & ba & ca \\ ab & (c+a)^2 & cb \\ ac & bc & (a+b)^2 \end{vmatrix} = 2abc(a+b+c)^3$.

8. If none of a,b,c is zero, show that $\Delta = \begin{vmatrix} -bc & b^2+bc & c^2+bc \\ a^2+ac & -ac & c^2+ac \\ a^2+ab & b^2+ab & -ab \end{vmatrix} = (ab+bc+ca)^3$.

9. Prove that $\begin{vmatrix} -a^2 & ab & ac \\ ab & -b^2 & bc \\ ac & bc & -c^2 \end{vmatrix} = 4a^2b^2c^2$.

10. Prove that $\begin{vmatrix} yz-x^2 & zx-y^2 & xy-z \\ zx-y^2 & xy-z^2 & yz-x \\ xy-z^2 & yz-x^2 & zx-y^2 \end{vmatrix}$ is divisible by (x + y + z) and hence find its quotient.

11.Prove that $\begin{vmatrix} a & b & c \\ a-b & b-c & c-a \\ b+c & c+a & a+b \end{vmatrix} = a^3+b^3+c^3-3abc$.

12. In a triangle ABC, prove that triangle ABC is an isosceles triangle if

$$\begin{vmatrix} 1 & 1 & 1 \\ 1+\sin A & 1+\sin B & 1+\sin C \\ \sin A+\sin^2 A & \sin B+\sin^2 B & \sin C+\sin^2 C \end{vmatrix} = 0 ,$$

Then prove that ΔABC is an isosceles triangle .

13. Solve for x :

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

14. Solve for x :

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

15. Prove that $\begin{vmatrix} \log a & p & 1 \\ \log b & q & 1 \\ \log c & r & 1 \end{vmatrix} = 0$, where a,b,c are positive and are the p^{th} ,q^{th} and r^{th} term of a GP .

16. Prove that $\begin{vmatrix} 1+a & 1 & 1 \\ 1 & 1+b & 1 \\ 1 & 1 & 1+c \end{vmatrix} = (bc+ca+ab+abc)$.

17. Prove that $\begin{vmatrix} a+bx^2 & c+dx^2 & p+qx^2 \\ ax^2+b & cx^2+d & px^2+q \\ u & v & w \end{vmatrix} = (x^4-1)\begin{vmatrix} b & d & q \\ a & c & p \\ u & v & w \end{vmatrix}$.

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

$x+2y+z=4$

$-x+y+z=0 \qquad x-3y+z=2$

19.Solve the following system of equations using matrix method:

$5x+3y+z=16$

$2x+y+3z=19$

$x+2y+4z=25$

20.If $A=\begin{bmatrix}1 & -1 & 2\\ 0 & 2 & -3\\ 3 & -2 & 4\end{bmatrix}, B=\begin{bmatrix}-2 & 0 & 1\\ 9 & 2 & -3\\ 6 & 1 & -2\end{bmatrix}$ then find AB and hence solve the system of linear equations:

$x+3z=9$

$-x+2y-2z=0$ $\quad$ $2x-3y+4z=-3$