



ABDULKALAM ACADEMY

TUITION - 6th to 12th

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WEEKLY TEST -

CLASS : XI

MARKS: 35

SUBJECT : MATHS.

DATE : 28.10.23

LESSON NAME: MATRICES AND DETERMINANTS.

I. Choose the correct answer

5x1 = 5

1. If a square matrix, then which of the following is not symmetric?

1) $A + A^T$

2) AA^T

3) $A^T A$

4) $A - A^T$

2. If $A = \begin{bmatrix} a & x \\ y & a \end{bmatrix}$ and if $xy = 1$, then $\det(AA^T)$ is equal to

1) $(a-1)^2$

2) $(a^2+1)^2$

3) $a^2 - 1$

4) $(a^2 - 1)^2$

3. The value of x, for which the matrix $A = \begin{bmatrix} e^{x-2} & e^{7+x} \\ e^{2+x} & e^{2x+3} \end{bmatrix}$ is singular

1) 9

2) 8

3) 7

4) 6

4. If $a \neq b, b, c$ satisfy $\begin{vmatrix} a & 2b & 2c \\ 3 & b & c \\ 4 & a & b \end{vmatrix} = 0$, then $abc =$

1) $a+b+c$

2) 0

3) b^3

4) $ab+bc$

5. If $A+I = \begin{bmatrix} 3 & -2 \\ 4 & 1 \end{bmatrix}$, then $(A+I)(A-I)$ is equal to

1) $\begin{bmatrix} -5 & -4 \\ 8 & -9 \end{bmatrix}$

2) $\begin{bmatrix} -5 & 4 \\ -8 & 9 \end{bmatrix}$

3) $\begin{bmatrix} 5 & 4 \\ 8 & 9 \end{bmatrix}$

4) $\begin{bmatrix} -5 & -4 \\ -8 & -9 \end{bmatrix}$

II. Answer the following question (any five) 5x3 = 15

6) Determine $3B+4C-D$, if B, C and D are given by

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

$C = \begin{bmatrix} -1 & -2 & 3 \\ -1 & 0 & 2 \end{bmatrix}$,

$D = \begin{bmatrix} 0 & 4 & -1 \\ 5 & 6 & -5 \end{bmatrix}$

7) Determine the value of $x+y$ if $\begin{bmatrix} 2x+y & 4x \\ 5x-7 & 4x \end{bmatrix} = \begin{bmatrix} 7 & 7y-13 \\ y & x+6 \end{bmatrix}$.

8. Show that $\begin{vmatrix} b+c & bc & bc^2 \\ c+a & ca & ca^2 \\ a+b & ab & ab^2 \end{vmatrix} = 0$

9. Prove that $\begin{vmatrix} 1+a & 1 & 1 \\ 1 & 1+b & 1 \\ 1 & 1 & 1+c \end{vmatrix} = abc \left(1 + \frac{1}{a} + \frac{1}{b} + \frac{1}{c} \right)$.

10. Show that $\begin{vmatrix} x & a & a \\ a & x & a \\ a & a & x \end{vmatrix} = (x-a)^2(x+2a)$

11. If $(k, 2)$, $(2, 4)$ and $(3, 2)$ are vertices of the triangle of area 4 square units then determine the value of k .

III. Answer any three questions

3 x 5 = 15

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

13. Show that $\begin{vmatrix} 1 & 1 & 1 \\ x & y & z \\ x^2 & y^2 & z^2 \end{vmatrix} = (x-y)(y-z)(z-x)$

14. If a, b, c are all positive, and are p^{th} , q^{th} and r^{th} terms of a G.P., show that $\begin{vmatrix} \log a & p & 1 \\ \log b & q & 1 \\ \log c & r & 1 \end{vmatrix} = 0$

15. If $A^T = \begin{bmatrix} 4 & 5 \\ -1 & 0 \\ 2 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & -1 & 1 \\ 7 & 5 & -2 \end{bmatrix}$, verify that $(A+B)^T = A^T + B^T$.

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

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