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Chapter End Test

(2019-20)

Date : _____ Duration : 45 Min. Max. Marks : 25	**Mathematics (Set-1)** **Topic :** Matrices & Determinants	**Class** **XII**

Disclaimer: The objective of long question is to test the understanding of the children and to write coherently in more than one paragraph.

Instructions:

- All questions are compulsory.
- This paper consist of two sections. Students have to attempt both sections.
- Section – A is objective carrying 1 mark each.
- Section – B is subjective.

Section A

1. If A is square matrix of order 3 such that $|\text{Adj}\,A| = 64$, then find $|A|$.

(a) ±4 (b) ± 8 (c) 36 (d) 48

2. for what value of x, the matrix $\begin{bmatrix} 2x+4 & 4 \\ x+5 & 3 \end{bmatrix}$ will be singular.

(a) 4 (b) –2 (c) –5 (d) –4

3. Find value of determinant $\begin{vmatrix} 4 & a & b+c \\ 4 & b & c+a \\ 4 & c & a+b \end{vmatrix}$.

(a) 4 (b) –4 (c) 0 (d) $a + b + c$

4. If $A = \begin{bmatrix} 1 & 2 \\ 4 & 2 \end{bmatrix}$ then find the value of k. If $|2A| = k|A|$.

(a) 4 (b) 2 (c) 1 (d) 0

5. For what values of x makes following pair of determinant equal?

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

(a) ± 4 (b) ± 2 (c) 1 (d) ± 8

6. Find the values of k if area of triangle is 4 sq. units and vertices of triangle are (–2, 0), (0, 4) and (0, k)

(a) 0, 8 (b) 0 (c) 8 (d) 4

7. If A is an invertible matrix of order 2, then det(A^{-1}) is equal to

(a) det (A) (b) $\frac{1}{\det(A)}$ (c) 1 (d) 0

8. If A is matrix of order $m \times n$ and B is a matrix such that AB′ and B′A are both defined, then order of matrix B is

(a) $m \times m$ (b) $n \times n$ (c) $n \times m$ (d) $m \times n$

9. On using elementary row operation $R_1 \to R_1 - 3R_2$ in the following matrix equation $\begin{bmatrix} 4 & 2 \\ 3 & 3 \end{bmatrix} = \begin{bmatrix} 1 & 2 \\ 0 & 3 \end{bmatrix}\begin{bmatrix} 2 & 0 \\ 1 & 1 \end{bmatrix}$, we have

(a) $\begin{bmatrix} -5 & -7 \\ 3 & 3 \end{bmatrix} = \begin{bmatrix} 1 & -7 \\ 0 & 3 \end{bmatrix}\begin{bmatrix} 2 & 0 \\ 1 & 1 \end{bmatrix}$ (b) $\begin{bmatrix} -5 & -7 \\ 3 & 3 \end{bmatrix} = \begin{bmatrix} 1 & 2 \\ 0 & 3 \end{bmatrix}\begin{bmatrix} -1 & -3 \\ 1 & 1 \end{bmatrix}$

(c) $\begin{bmatrix} -5 & -7 \\ 3 & 3 \end{bmatrix} = \begin{bmatrix} 1 & 2 \\ 1 & -7 \end{bmatrix}\begin{bmatrix} 2 & 0 \\ 1 & 1 \end{bmatrix}$ (d) None of these

10. If A and B are matrices of same order, then (AB′ – BA′) is a

(a) skew symmetric matrix (b) null matrix

(c) symmetric matrix (d) unit matrix

11. If matrix $A = [a_{ij}]_{2 \times 2}$ where

$$a_{ij} = \begin{cases} 1 & if \quad i \neq j \\ 0 & if \quad i = j \end{cases}$$

then A^2 is equal to

(a) I (b) A (c) O (d) None of these

12. If A is symmetric matrix then B′AB is

(a) skew symmetric (b) symmetric (c) not symmetric (d) not skew symmetric

13. If A is a skew symmetric matrix than A^2 is a

(a) Null matrix (b) unit matrix (c) symmetric (d) skew symmetric

14. If $A = \begin{bmatrix} 2 & -1 & 3 \\ -4 & 5 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 3 \\ 4 & -2 \\ 1 & 5 \end{bmatrix}$ then

(a) only AB is defined (b) only BA is defined

(c) AB and BA both are not defined (d) AB and BA both are defined

15. If $[2x \ 3]\begin{bmatrix} 1 & 2 \\ -3 & 0 \end{bmatrix}\begin{bmatrix} x \\ 8 \end{bmatrix} = 0$ then values of x are

(a) $0, \frac{23}{2}$ (b) $0, -\frac{23}{3}$ (c) $0, -\frac{23}{2}$ (d) $0, \frac{23}{7}$

Section B

16. Using properties of determinant, prove that: $\begin{vmatrix} 1+a^2-b^2 & 2ab & -2b \\ 2ab & 1-a^2+b^2 & 2a \\ 2b & -2a & 1-a^2-b^2 \end{vmatrix} = (1 + a^2 + b^2)^3$. **[4]**

17. (a) If $A = \begin{bmatrix} 1 & -1 & 0 \\ 2 & 3 & 4 \\ 0 & 1 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 2 & -4 \\ -4 & 2 & -4 \\ 2 & -1 & 5 \end{bmatrix}$, then find AB. Use this to solve the system of equations.

x – y = 3

2x + 3y + 4z = 17

y + 2z = 7. **[4]**

(b) Let $A = \begin{bmatrix} 2 & 3 \\ -1 & 2 \end{bmatrix}$, then show that $A^2 - 4A + 7I = 0$ and hence find A^5. **[2]**

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1.	(b)	**2.**	(a)	**3.**	(c)	**4.**	(a)	**5.**	(a)
6.	(a)	**7.**	(b)	**8.**	(d)	**9.**	(a)	**10.**	(a)
11.	(a)	**12.**	(b)	**13.**	(c)	**14.**	(d)	**15.**	(c)

17. (b) We have $A^2 = \begin{bmatrix} 2 & 3 \\ -1 & 2 \end{bmatrix}\begin{bmatrix} 2 & 3 \\ -1 & 2 \end{bmatrix} = \begin{bmatrix} 1 & 12 \\ -4 & 1 \end{bmatrix}$, $-4A = \begin{bmatrix} -8 & -12 \\ 4 & -8 \end{bmatrix}$ and $7I = \begin{bmatrix} 7 & 0 \\ 0 & 7 \end{bmatrix}$.

Therefore, $A^2 - 4A + 7I = \begin{bmatrix} 1-8+7 & 12-12+0 \\ -4+4+0 & 1-8+7 \end{bmatrix} = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix} = O$

$\Rightarrow \quad A^2 = 4A - 7I$

Thus $A^3 = A.A^2 = A(4A - 7I) = 4(4A - 7I) - 7A$

$= 16A - 28I - 7A = 9A - 28I$

and so $A^5 = A^3A^2$

$= (9A - 28I)(4A - 7I)$

$= 36A^2 - 63A - 112A + 196I$

$= 36(4A - 7I) - 175A + 196I$

$= -31A - 56I$

$= -31\begin{bmatrix} 2 & 3 \\ -1 & 2 \end{bmatrix} - 56\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

$= \begin{bmatrix} -118 & -93 \\ 31 & -118 \end{bmatrix}$