# XII EXAM No: 7 (MIXED OBJECTIVE + SUBJECTIVE)

## MATRICES & DETERMINANTS

MARKS:- 70 | TIME: 2 hr

### SECTION: A: OBJECTIVE (~~ONE~~ TWO MARKS EACH) : 30

**QNS:-1** A square matrix $A = [a_{ij}]_{n \times n}$ is called a lower triangular matrix if $a_{ij} = 0$ for

(A) $i = j$ (b) $i < j$ (b) $i > j$ (d) none of the ~~above~~ them

**QNS:-2** → If $A = \begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}$ and $f(x) = (1+x)(1-x)$, then $f(A)$ is

(A) $-4\begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$ (B) $-8\begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$ (C) $4\begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$ (D) none of them

**QNS:-3** → $\begin{bmatrix} 1 & x & 1 \end{bmatrix} \begin{bmatrix} 1 & 3 & 2 \\ 2 & 5 & 1 \\ 15 & 3 & 2 \end{bmatrix} \begin{bmatrix} 1 \\ 2 \\ x \end{bmatrix} = 0$ ; if $x =$

(A) $-7$ (B) $-11$ (C) $-2$ (D) $14$

**QN:4** → If a square matrix $A = [a_{ij}]$ ; $a_{ij} = i^2 - j^2$ is of even order, then

(A) A is a Skew-symm. matrix (B) Null matrix

(C) A is a symm. Matrix (D) neither symm nor skew-symm.

**QN. 5** → If $A = \begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$ satisfies $A^4 = kA'$, then value of k is

(A) 1 (B) 4 (C) 8 (D) 10

**QN. 6** → If $A = \begin{bmatrix} b & 2 & a \\ 2 & 1 & -2 \\ -2 & 2 & -1 \end{bmatrix}$ is a matrix satisfying $AA' = 9I$ then value of a & b are respectively

(A) 1, 2 (B) 2, 1 (C) $-1, 2$ (D) $-2, 1$

Ans. 7 → The value of $\Delta = \begin{vmatrix} \cos(\alpha+\beta) & -\sin(\alpha+\beta) & \cos(2\beta) \\ \sin\alpha & \cos\alpha & \sin\beta \\ -\cos\alpha & \sin\alpha & \cos\beta \end{vmatrix}$ is independent of

(A) $\alpha$ (B) $\beta$ (C) $\alpha$ and $\beta$ (d) none of these

~~Ans. 8 → If the points of are collinear~~

Ans. 8 → If the points $(a_1, b_1)$, $(a_2, b_2)$ & $(a_1+a_2, b_1+b_2)$ are collinear then

(A) $a_1 b_2 = a_2 b_1$ (B) $a_1 + a_2 = b_1 + b_2$ (C) $a_2 b_2 = a_1 b_1$

(D) $a_1 b_2 + a_2 b_1 = 0$

Ans. 9 → If the system of equations $x + y + z = 2$, $2x + y - z = 3$ & $3x + 2y + kz = 4$ has a unique solution, if k is not equal to

(A) 4 (B) $-4$ (C) 0 (D) 1

Ans. 10 → If for the non-singular matrix A, $A^3 = A^2$, then $A^{-1}$ is equal to

(A) A (B) $A^2$ (C) I (D) none of these

Ans. 11 → order $3\times 3$; $|3AB| = 405$; $|A'| = 3$, then $|B| =$

(A) 81 (B) $-5$ (C) 5 (D) 27

Qns :-12 → order $4 \times 4$ ; $|Adj\, A| = -27$ , then $|-A| =$

(A) 3 (B) $-3$ (C) $\frac{1}{3}$ (D) 81

Qn:- 13 → If the area of triangle ABC with vertices $A(1,3)$ $B(0,0)$ $C(k,0)$ is 3 square units, then value of k is

(A) 2 (B) 3 (C) 4 (D) 5

Qn 14 → let $f(t) = \begin{vmatrix} \cos t & t & 1 \\ 2\sin t & t & 2t \\ \sin t & t & t \end{vmatrix}$ then $\lim_{t \to 0} \left( \frac{f(t)}{t^2} \right)$ is equal to

(A) 0 (B) $-1$ (C) 2 (D) 3

Qn:- 15 → If $A = \frac{1}{\lambda} \begin{bmatrix} \sin^{-1}(\lambda x) & \tan^{-1}\left(\frac{x}{\lambda}\right) \\ \sin^{-1}\left(\frac{x}{\lambda}\right) & \cot^{-1}(\lambda x) \end{bmatrix}$ &

$B = \frac{1}{\lambda} \begin{bmatrix} -\cos^{-1}(\lambda x) & \tan^{-1}\left(\frac{x}{\lambda}\right) \\ \sin^{-1}\left(\frac{x}{\lambda}\right) & -\tan^{-1}(\lambda x) \end{bmatrix}$ then $A-B$ is equal to

(A) $I$ (B) $O$ (C) $2I$ (D) $\frac{1}{2}I$

## SECTION: B :- SUBJECTIVE (FOUR MARKS EACH) = 40

Qns:- 16 → A manufacturer produces three products $x, y, z$ which he sells in two markets. Annual sales are indicated below:

| Market | Products | | |
|---|---|---|---|
| I | 10000 | 2000 | 18000 |
| II | 6000 | 20000 | 8000 |

If unit sale prices of $x$, $y$ and $z$ are Rs 2.50, Rs 1.50 & Rs 1.00 respectively and unit cost price of these products are Rs 2.00, Rs 1.00 & 50 paise respectively. Find the gross profit

**Ans - 17** → If $A$ and $B$ are symmetric matrices of the same order, then show that $AB$ is symmetric if and only if $A$ and $B$ commute, i.e $AB = BA$

**Qn. 18** → let $A = \begin{bmatrix} \cos\alpha & -\sin\alpha \\ \sin\alpha & \cos\alpha \end{bmatrix}$ such that

$A^{32} = \begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$, then value of $\alpha$ is

(A) $0$ (B) $\frac{\pi}{16}$ (C) $\frac{\pi}{64}$ (D) $\frac{\pi}{32}$

(Note. give complete explanation : 0 Marks only for answer)

**Qn. 19** → let $A = \begin{bmatrix} 1 & -1 & 1 \\ 2 & 1 & -3 \\ 1 & 1 & 1 \end{bmatrix}$ & $10B = \begin{bmatrix} 4 & 2 & 2 \\ -5 & 0 & \alpha \\ 1 & -2 & 3 \end{bmatrix}$

if $B$ is the Inverse of $A$, then find $\alpha$

**Qn. 20** → let $A = \begin{bmatrix} \cos^2\theta & \sin\theta\cos\theta \\ \cos\theta\sin\theta & \sin^2\theta \end{bmatrix}$ and $B = \begin{bmatrix} \cos^2\phi & \sin\phi\cos\phi \\ \cos\phi\sin\phi & \sin^2\phi \end{bmatrix}$

then $AB = O$, if

(A) $\theta = n\pi$ ; $n = 0, 1, 2, \ldots$

(B) $\theta + \phi = (2n+1)\frac{\pi}{2}$ ; $n \in Z$

(C) $\theta = \phi + (2n+1)\pi/2$ ; $n \in Z$

(D) none of them

(Note: give Complete explanation)

**Ans. 21 →** given $A = \begin{bmatrix} 2 & 2 & -4 \\ -4 & 2 & -4 \\ 2 & -1 & 5 \end{bmatrix}$ & $B = \begin{bmatrix} 1 & -1 & 0 \\ 2 & 3 & 4 \\ 0 & 1 & 2 \end{bmatrix}$

find $BA$ and use this to solve the system of equations $y+2z=7$ ; $x-y=3$ ; $2x+3y+4z=17$

**Ans. 22 →** for the matrix $A = \begin{bmatrix} 3 & 2 \\ 1 & 1 \end{bmatrix}$ find the numbers $a$ & $b$ such that $A^2 + aA + bI = O$.

Hence find $A^{-1}$

**Ans. 23 →** find matrix $X$ such that

$$\begin{bmatrix} 3 & 2 \\ 7 & 5 \end{bmatrix} X \begin{bmatrix} -1 & 1 \\ -2 & 1 \end{bmatrix} = \begin{bmatrix} 2 & -1 \\ 0 & 4 \end{bmatrix}$$

**Ans. 24 →** If $\begin{bmatrix} 1 & -\tan\theta \\ \tan\theta & 1 \end{bmatrix} \begin{bmatrix} 1 & \tan\theta \\ -\tan\theta & 1 \end{bmatrix}^{-1} = \begin{bmatrix} a & -b \\ b & a \end{bmatrix}$

then find $a$ & $b$

**Ans. 25 →** If $f(x) = ax^2 + bx + c$ is a quadratic polynomial such that $f(1) = 8$ ; $f(2) = 11$ and $f(-3) = 6$ find $f(x)$ using matrix method

— x —

Scanned with CamScanner