39/40

Preliminary Test-1 (2024-25)
Subject: Mathematics
Date: 19/06/25
Time: 2 Hours
Maximum Marks: 40

Name: Anyush K
Class: 12 Division Vega
Roll No:
Invigilator's Sign:

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General Instructions:
The Question paper contains five sections A, B, C, D and E. All section is compulsory. However, there are internal choices in some questions.
Section A: MCQ - 8 x 1 mark =8 and 1 AR Total 8+1=9 marks.
Section B:VSA - 4 x 2 marks =8 marks.
Section C: SA - 3 x 3 marks =9 marks.
Section D: LA- 2 x 5=10 marks.
Section E: CBQ- 1 x 4=4 marks.

Section-A

1 If A is square matrix, then A is symmetric, if 1
a) $A^2 = A$ b) $A^T = A$ c) $A^T = -A$ d) $A^2 = I$

2 The number of all possible matrices of order 3 × 3 with each entry 0 or1 is 1
a) 81 b) 27 c) 512 d) 18

3 The adjoint of the matrix $\begin{bmatrix}1 & 2\\3 & 4\end{bmatrix}$ is 1
a) $\begin{bmatrix}4 & -2\\-3 & -1\end{bmatrix}$ b) $\begin{bmatrix}4 & -2\\-3 & 1\end{bmatrix}$ c) $\begin{bmatrix}4 & -3\\-2 & 1\end{bmatrix}$ d) $\begin{bmatrix}4 & -2\\1 & -3\end{bmatrix}$

4 The equations, x + 4y − 2z = 3, 3x + y + 5z = 7, 2x + 3y +z = 5 have 1
a) no solution b) two solution c) a unique solution d) infinitely many solutions

5 If $\begin{bmatrix}x & -5 & -1\end{bmatrix}\begin{bmatrix}1 & 0 & 2\\0 & 2 & 1\\2 & 0 & 3\end{bmatrix}\begin{bmatrix}x\\4\\1\end{bmatrix} = 0$, then the value ofx is 1
a) $\pm 6\sqrt{5}$ b) $5\sqrt{5}$ c) $\pm 4\sqrt{3}$ d) $\pm 3\sqrt{5}$

6 If $A = \begin{vmatrix}1 & 1 & 1\\1 & 1 & 1\\1 & 1 & 1\end{vmatrix}$, then A^2 is: 1
a) 27A b) 3A c) 2A d) I

7 Find the matrix X for which $\begin{vmatrix}1 & -4\\3 & -2\end{vmatrix} X = \begin{vmatrix}-16 & -6\\7 & 2\end{vmatrix}$ 1
a) $\begin{vmatrix}6 & 2\\11 & 2\end{vmatrix}$ b) $\begin{vmatrix}6 & 2\\11/2 & 2\end{vmatrix}$ c) $\begin{vmatrix}6 & 2\\-11 & 2\end{vmatrix}$ d) $\begin{vmatrix}11 & 0\\6 & 0\end{vmatrix}$

8 If A and B are two matrices such that AB = B and BA = A, then $A^2 + B^2$ is equal to 1
a) A + B b) 2 BA c) AB d) 2 AB

ASSERTION-REASON BASED QUESTIONS

In the following questions, a statement of assertion(A) is followed by a statement of reason(R). Choose the correct answer out of the following choices.

9 **Assertion (A):** If $A = \begin{bmatrix}3 & -2\\4 & -2\end{bmatrix}$ and $I = \begin{bmatrix}1 & 0\\0 & 1\end{bmatrix}$, then the value of k such that $A^2 = kA - 2I$, is 1
- 1.

Reason (R): If A and B are square matrices of same order, then (A + B)(A + B) is equal to $A^2 + AB + BA + B^2$.

a) Both A and R are true and R is the correct explanation of A.
b) Both A and R are true but R is not the correct explanation of A.
c) A is true but R is false.
d) A is false but R is true.

Section-B

10 If A is a square matrix satisfying $A^T A = I$, write the value of $|A|$. 2

11 If $A=\begin{bmatrix}2 & -1\\3 & 4\\1 & 5\end{bmatrix}$ and $B=\begin{bmatrix}-1 & 3\\2 & 1\end{bmatrix}$ find AB. Does BA exist? 2

12 If $\begin{vmatrix}x & 6\\-1 & 2w\end{vmatrix}+\begin{bmatrix}4 & x+y\\z+w & 3\end{bmatrix}=3\begin{bmatrix}x & y\\z & w\end{bmatrix}$, find the values of x, y, z, w. 2

13 Find the area of the triangle with vertices at the points given 2

$(-2,-3),(3,2)$ *and* $(-1,-8)$.

OR

Find value of k if area of triangle is 4 sq. units and vertices are : $(k,0),(4,0),(0,2)$.

Section-C

14 If I is the identity matrix and A is a square matrix such that $A^2 = A$, then what is the value of $(I + A)^2 - 3A$? 3

15 If $A=\begin{bmatrix}1 & 2 & -2\\-1 & 3 & 0\\0 & -2 & 1\end{bmatrix}$ and $B^{-1}=\begin{bmatrix}3 & -1 & 1\\-15 & 6 & -5\\5 & -2 & 2\end{bmatrix}$, find $(AB)^{-1}$ 3

OR

Find the values of x, y, z if the matrix $A=\begin{bmatrix}0 & 2y & z\\x & y & -z\\x & -y & z\end{bmatrix}$ satisfy the equation $A'A = I$.

16 Find x, if $\begin{bmatrix}x & -5 & -1\end{bmatrix}\begin{bmatrix}1 & 0 & 2\\0 & 2 & 1\\2 & 0 & 3\end{bmatrix}\begin{bmatrix}x\\4\\1\end{bmatrix}=0$ 3

Section-D

15 If $A=\begin{bmatrix}5 & -1 & 4\\2 & 3 & 5\\5 & -2 & 6\end{bmatrix}$, find A^{-1} and use it to solve the following system of equations: 5

$5x - y + 4z = 5$

$2x + 3y + 5z = 2$

$5x - 2y + 6z = -1$

16 Verify A (adj. A) = (adj. A) A = |A|I: 5

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

Section-E

17 **Read the following text carefully and answer the questions that follow:** 4

Each triangular face of the Pyramid of Peace in Kazakhstan is made up of 25 smaller equilateral triangles as shown in the figure.

1. If the vertices of one of the smaller equilateral triangle are (0, 0), $(3,\sqrt{3})$ and $(3, -\sqrt{3})$, then find the area of such triangle. (1)
2. Find the area of a face of the Pyramid. (1)
3. Find the length of a altitude of a smaller equilateral triangle. (2)

OR

Let A(a, 0), B(0, b) and C(1, 1) be three points. If $\frac{1}{a} + \frac{1}{b} = 1$, then find the relation between three points.(2)