



Sharp Test Series — Sample Paper

Chapter Test

QUESTION PAPER CODE
SMPLTHY-2026-000114

Total Questions

14

Subjects

Mathematics

Maximum Marks

30

Time

**1 Hour 30
Minutes**

Instructions

1. All questions are compulsory unless the section heading says otherwise.
2. Figures to the right indicate full marks.
3. Draw neat, labelled diagrams wherever necessary.
4. In numerical questions, write the formula, the working and the answer with units.
5. Write all your answers in the separate answer booklet.

SECTION A — Multiple Choice Questions

[5]

Attempt **all** questions. Each question carries 1 mark.

Q.1 If $A = \begin{bmatrix} 3 & 1 \\ 5 & 2 \end{bmatrix}$, then $A^{-1} = ?$

[1]

(A) $\begin{bmatrix} 2 & 1 \\ 5 & 3 \end{bmatrix}$

(B) $\begin{bmatrix} 3 & -1 \\ -5 & 2 \end{bmatrix}$

(C) $\begin{bmatrix} 2 & -1 \\ -5 & 3 \end{bmatrix}$

(D) $\begin{bmatrix} -2 & 1 \\ 5 & -3 \end{bmatrix}$

Q.2 A matrix that equals its own transpose ($A = A^T$) is called:

[1]

(A) A symmetric matrix

(B) A skew-symmetric matrix

(C) An identity matrix

(D) A null matrix

Q.3 Let $A = \begin{bmatrix} 5 & 5\lambda & \lambda \\ 0 & \lambda & 5\lambda \\ 0 & 0 & 5 \end{bmatrix}$ with $\lambda \neq 0$ and $|A^{-2}| = 1/25$. Then $\lambda = \dots\dots$

[1]

(A) ± 5

(B) ± 1

(C) ± 25

(D) $\pm 1/5$

Q.4 Let M be a 3 by 3 matrix such that M times the column $(1, 0, 0)$ is the column $(1, 2, 3)$, M times the column $(0, 1, 0)$ is the column $(0, 1, 2)$ and M times the column $(0, 0, 1)$ is the column $(-1, 1, 1)$. If M times the column (x, y, z) is the column $(1, 7, 11)$, then $x + y + z$ equals :

[1]

(A) 4

(B) 5

(C) 7

(D) 11

Q.5 If $A = \begin{bmatrix} 0 & -i \\ -i & 0 \end{bmatrix}$ with $i = \sqrt{-1}$, then $A^{(-50)} = \dots\dots$

[1]

(A) $-A$

(B) I

(C) A

(D) $-I$

SECTION B — Short Answer Questions

[8]

Attempt **all** questions. Each question carries 2 marks.

Q.6 If A is a square matrix such that $A^2 = I$, show that A is invertible and $A^{-1} = A$. Verify that $A =$

[2]

$\begin{bmatrix} 1 & 0 \\ 2 & -1 \end{bmatrix}$ is such a matrix.

Q.7 Find the inverse of $A = \begin{bmatrix} 1 & -2 & 0 \\ 0 & 1 & 4 \\ 0 & 0 & 1 \end{bmatrix}$ by elementary row transformations.

[2]

Q.8 Without solving, state with reason whether the equations $2x - 4y = 3$ and $-3x + 6y = 1$ can be solved by the method of inversion. [2]

Q.9 If $A^{-1} = \begin{bmatrix} 1 & 2 \\ 0 & 1 \end{bmatrix}$ and $B^{-1} = \begin{bmatrix} 3 & 1 \\ 2 & 1 \end{bmatrix}$, find $(AB)^{-1}$. [2]

SECTION C — Short Answer Questions

[9]

Attempt **all** questions. Each question carries 3 marks.

Q.10 The sum of two numbers is 14, and three times the first number exceeds twice the second number by 12. Form the matrix equation and find the numbers by the method of reduction. [3]

Q.11 Show that the matrix $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 5 & 7 \\ 1 & 3 & 4 \end{bmatrix}$ has no inverse, first by evaluating $|A|$ and then by attempting to find A^{-1} by elementary row transformations. [3]

Q.12 Solve the following equations by the method of reduction: $y + 2z = 5$, $x + y + z = 4$, $3x - y + 2z = 13$. [3]

SECTION D — Long Answer Questions

[8]

Attempt **all** questions. Each question carries 4 marks.

Q.13 For $A = \begin{bmatrix} 1 & 2 & 0 \\ 0 & 1 & 1 \\ 1 & 0 & 2 \end{bmatrix}$, verify that $A (\text{adj } A) = (\text{adj } A) A = |A| I$. [4]

Q.14 The sum of three numbers is 9. The first number minus the second number plus twice the third number is 7. Three times the first number plus the second number minus the third number is 5. Find the numbers by the method of inversion. [4]