

Maxprap. Chapter wise Series Class 12th – Matrix

Class : 12th

Subject: Mathematics

Max. Marks : 50

Duration : 2 Hrs

Sections: A (MCQs), B (Short Answer-I), C (Short Answer-II), D (Long Answer), E (Case-Based).

General Instructions:

- (i). All questions are compulsory.
- (ii). This question paper contains 23 questions divided into five Sections A, B, C, D and E. (iii). Section A comprises of 10 MCQs of 1 mark each. Section B comprises of 5 questions of 2 marks each. Section C comprises of 4 questions of 3 marks each. Section D comprises of 2 question of 5 marks each and Section E comprises of 2 Case Study Based Questions of 4 marks each.
- (iv). There is no overall choice.
- (v). Use of Calculators is not permitted.

Section A

Questions 1 to 10 carry 1 mark each

1. If $[x \quad -5 \quad -1] \begin{bmatrix} 1 & 0 & 2 \\ 0 & 2 & 1 \\ 2 & 0 & 3 \end{bmatrix} \begin{bmatrix} x \\ 4 \\ 1 \end{bmatrix} = 0$, then the value of x is
a) $\pm 6\sqrt{5}$ b) $\pm 3\sqrt{5}$ c) $\pm 4\sqrt{3}$ d) $5\sqrt{5}$
2. Find the value of x and y are respectively, if $\begin{bmatrix} x & y \\ 3y & x \end{bmatrix} \begin{bmatrix} 1 \\ 2 \end{bmatrix} = \begin{bmatrix} 3 \\ 5 \end{bmatrix}$.
a) 3, 2 b) 4, 3 c) 2, 1 d) 1, 1
3. If $A = \begin{bmatrix} 1 & 0 \\ -1 & 7 \end{bmatrix}$ and $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$, then the value of k, so that $A^2 = 8A + KI$ is
a) 6 b) 5 c) 4 d) - 7
4. Assume X, Y, Z, W, and P are matrices of order $2 \times n$, $3 \times k$, $2 \times p$, $n \times 3$ and $p \times k$, respectively. If $n = p$, then the order of the matrix $7X - 5Z$ is
a) $p \times 2$ b) $p \times n$ c) $2 \times n$ d) $n \times 3$
5. If A is square matrix such that $A^2 = A$, then $(I + A)^3 - 7A$ is equal to
a) $I - A$ b) A c) I d) 3A
6. Number of symmetric matrices of order 3×3 with each entry 1 or - 1 is
a) 8 b) 4 c) 512 d) 64
7. If for a square matrix A, $A^2 - 3A + I = O$ and $A^{-1} = xA + yI$, then the value of $x + y$ is:
a) 2 b) - 2 c) - 3 d) 3

If A, B are symmetric matrices of same order, then $AB - BA$ is a

- a) Identity matrix b) Symmetric matrix c) Zero matrix d) Skew symmetric matrix

Assertion(A)/Reason(R) Based (9-10): 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.

- 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.

9. Assertion (A): If $\begin{bmatrix} xy & 4 \\ z+5 & x+y \end{bmatrix} = \begin{bmatrix} 4 & w \\ 0 & 4 \end{bmatrix}$, then $x = 2$, $y = 2$, $z = -5$ and $w = 4$.

Reason (R): Two matrices are equal, if their orders are same and their corresponding elements are equal.

10. Assertion (A): If $A = \begin{bmatrix} 2 & x-3 & x-2 \\ 3 & -2 & -1 \\ 4 & -1 & -5 \end{bmatrix}$ is a symmetric matrix, then $x = 6$.

Reason (R): If A is a symmetric matrix, then $A = A'$.

SECTION – B

Questions 11 to 15 carry 2 marks each

11. Construct $A_{2 \times 2}$ matrix, where $a_{ij} = \frac{(i-2j)^2}{2}$
12. If $A = \begin{bmatrix} \cos \alpha & \sin \alpha \\ -\sin \alpha & \cos \alpha \end{bmatrix}$, show that $A^2 = \begin{bmatrix} \cos 2\alpha & \sin 2\alpha \\ -\sin 2\alpha & \cos 2\alpha \end{bmatrix}$
13. If $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$ show that $A^2 - 5A + 7I = 0$.
14. Express matrix $A = \begin{bmatrix} 2 & 9 \\ 2 & 6 \end{bmatrix}$ as a sum of symmetric and skew - symmetric matrix.
15. Find the matrix X so that $X \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix} = \begin{bmatrix} -7 & -8 & -9 \\ 2 & 4 & 6 \end{bmatrix}$

SECTION – C

Questions 16 to 19 carry 3 marks each

16. If $f(x) = x^2 - 5x + 7$ and $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$ then find the value of $f(A)$.
17. If $\begin{bmatrix} xy & 4 \\ z+6 & x+y \end{bmatrix} = \begin{bmatrix} 8 & w \\ 0 & 6 \end{bmatrix}$, then find values of x , y , z and w .

18. Let $A = \begin{bmatrix} 2 & -1 \\ 3 & 4 \end{bmatrix}$, $B = \begin{bmatrix} 5 & 2 \\ 7 & 4 \end{bmatrix}$, $C = \begin{bmatrix} 2 & 5 \\ 3 & 8 \end{bmatrix}$. Find a matrix D such that $CD - AB = 0$

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

SECTION – D

Questions 20 to 21 carry 5 marks each

20. If $A = \begin{bmatrix} 0 & -\tan \frac{\alpha}{2} \\ \tan \frac{\alpha}{2} & 0 \end{bmatrix}$ and I is the identity matrix of order 2, show that

$$I + A = (I - A) \begin{bmatrix} \cos \alpha & -\sin \alpha \\ \sin \alpha & \cos \alpha \end{bmatrix}.$$

21. Find X and Y, if:

a) $X + Y = \begin{bmatrix} 7 & 0 \\ 2 & 5 \end{bmatrix}$ and $X - Y = \begin{bmatrix} 3 & 0 \\ 0 & 3 \end{bmatrix}$

b) $2X + 3Y = \begin{bmatrix} 2 & 3 \\ 4 & 0 \end{bmatrix}$ and $3X + 2Y = \begin{bmatrix} -2 & -2 \\ -1 & 5 \end{bmatrix}$

SECTION – E (Case Study Based Questions)

Questions 22 & 23 carry 4 marks each

22. Read the following text carefully and answer the questions that follow:

In a city there are two factories A and B. Each factory produces sports clothes for boys and girls. There are three types of clothes produced in both the factories type I, type II and type III. For boys the number of units of types I, II and III respectively are 80, 70 and 65 in factory A and 85, 65 and 72 are in factory B. For girls the number of units of types I, II and III respectively are 80, 75, 90 in factory A and 50, 55, 80 are in factory B.



a) Write the matrix P, if P represents the matrix of number of units of each type produced by factory A for both boys and girls. (1)

- b) Write the matrix Q , if Q represents the matrix of number of units of each type produced by factory B for both boys and girls. (1)
- c) Find the total production of sports clothes of each type for boys. (2)

OR

Find the total production of sports clothes of each type for girls. (2)

23. Read the following text carefully and answer the questions that follow:

A trust fund has ₹ 35000 that must be invested in two different types of bonds, say X and Y. The first bond pays 10% interest p.a. which will be given to an old age home and second one pays 8% interest p.a. which will be given to WWA (Women Welfare Association). Let A be a 1×2 matrix and B be a 2×1 matrix, representing the investment and interest rate on each bond respectively.



- a) Represent the given information in matrix algebra. (1)
- b) If ₹ 15000 is invested in bond X, then find total amount of interest received on both bonds? (1)
- c) If the trust fund obtains an annual total interest of ₹ 3200, then find the investment in two bonds. (2)

OR

If the amount of interest given to old age home is ₹ 500, then find the amount of investment in bond Y. (2)

Matrix Paper Details – Analysis		
Objective Questions		
MCQ	1 marks x 8 question = 8	
Assertion Reason	1 marks x 2 question = 2	
Subjective		
Short type I	2 marks x 5 question = 10	
Short type II	3 marks x 4 question = 12	
Long Type	5 marks x 2 question = 10	
Case Studies Based		
Case 1	4 marks	
Case 2	4 marks	

Total = 50 marks Your Score =