

Model Question Paper

Matrices - Part I

10th Standard

Maths

Reg.No. :

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I. Answer all the questions.

II. Use Blue pen only.

III. Question No 19 is compulsory

Time : 01:00:00 Hrs

Total Marks : 50

6 x 1 = 6

Section-A

- 1) If $\begin{pmatrix} a & 3 \\ 1 & 2 \end{pmatrix} \begin{pmatrix} 2 \\ -1 \end{pmatrix} = \begin{pmatrix} 5 \\ 0 \end{pmatrix}$, then the value of a is
(a) 8 (b) 4 (c) 2 (d) 11
- 2) If $A = \begin{pmatrix} \alpha & \beta \\ \gamma & -\alpha \end{pmatrix}$ is such that $A^2 = I$, then
(a) $1 + \alpha^2 + \beta\gamma = 0$ (b) $1 - \alpha^2 + \beta\gamma = 0$ (c) $1 - \alpha^2 - \beta\gamma = 0$ (d) $1 + \alpha^2 - \beta\gamma = 0$
- 3) If $A = [a_{ij}]_{2 \times 2}$ and $a_{ij} = i + j$, then $A =$
(a) $\begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$ (b) $\begin{pmatrix} 2 & 3 \\ 3 & 4 \end{pmatrix}$ (c) $\begin{pmatrix} 2 & 3 \\ 4 & 5 \end{pmatrix}$ (d) $\begin{pmatrix} 4 & 5 \\ 6 & 7 \end{pmatrix}$
- 4) $\begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} a & b \\ c & d \end{pmatrix} = \begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}$ then the values of a, b, c and d respectively are
(a) -1, 0, 0, -1 (b) 1, 0, 0, 1 (c) -1, 0, 1, 0 (d) 1, 0, 0, 0
- 5) If $A = \begin{pmatrix} 7 & 2 \\ 1 & 3 \end{pmatrix}$ and $A + B = \begin{pmatrix} -1 & 0 \\ 2 & -4 \end{pmatrix}$ then the matrix B =
(a) $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$ (b) $\begin{pmatrix} 6 & 2 \\ 3 & -1 \end{pmatrix}$ (c) $\begin{pmatrix} -8 & -2 \\ 1 & -7 \end{pmatrix}$ (d) $\begin{pmatrix} 8 & 2 \\ -1 & 7 \end{pmatrix}$
- 6) If $\begin{pmatrix} 5 & x & 2 \\ -1 \\ 3 \end{pmatrix} = (20)$ then the value of x is
(a) 7 (b) -7 (c) $\frac{1}{7}$ (d) 0

Section-B

8 x 2 = 16

- 7) The table shows a five-day forecast indicating high (H) and low (L) temperatures in Fahrenheit. Organise the temperatures in a matrix where the first and second rows represent the High and Low temperatures respectively and identify which day will be the warmest?
- 8) The amount of fat, carbohydrate and protein in grams present in each food item respectively are as follows:

	Item 1	Item 2	Item 3	Item 4
Fat	5	0	1	10
Carbohydrate	0	15	6	9
Protein	7	1	2	8

Use the information to write 3x4 and 4x3 matrices.

- 9) Let $A = [a_{ij}] = \begin{bmatrix} 1 & 4 & 8 \\ 6 & 2 & 5 \\ 3 & 7 & 0 \\ 9 & -2 & -1 \end{bmatrix}$. Find (i) the order of the matrix (ii) the elements a_{13} and a_{42} (iii) the position of the element 2.

- 10) Construct a 2x3 matrix $A = [a_{ij}]$ whose elements are given by $a_{ij} = |2i - 3j|$

- 11) If $a = \begin{pmatrix} 8 & 5 & 2 \\ 1 & -3 & 4 \end{pmatrix}$ then find A^T and $(A^T)^T$

- 12) The rates for the entrance tickets at a water theme park are listed below:

	Week Days rates(Rs)	Week End rates(Rs)
Adult	400	500
Children	200	250
Senior Citizen	300	400

Write down the matrices for the rates of entrance tickets for adults, children and senior citizens. Also find the dimensions of the matrices.

- 13) There are 6 Higher Secondary Schools, 8 High Schools and 13 Primary Schools in a town. Represent these data in the form of 3X1 and 1X3 matrices.

- 14) A matrix has 8 elements. What are the possible orders it can have?

Section-C

6 x 5 = 30

- 15) Find X and Y if $2X + 3Y = \begin{pmatrix} 2 & 3 \\ 4 & 0 \end{pmatrix}$ and $3X + 2Y = \begin{pmatrix} 2 & -2 \\ -1 & 5 \end{pmatrix}$
- 16) Solve for x and y if $\begin{pmatrix} x^2 \\ y^2 \end{pmatrix} + 3 \begin{pmatrix} 2x \\ -y \end{pmatrix} = \begin{pmatrix} -9 \\ 4 \end{pmatrix}$.
- 17) If $A = \begin{pmatrix} 4 & 1 & 2 \\ 1 & -2 & 3 \\ 0 & 3 & 2 \end{pmatrix}$, $B = \begin{pmatrix} 2 & 0 & 4 \\ 6 & 2 & 8 \\ 2 & 4 & 6 \end{pmatrix}$ and $C = \begin{pmatrix} 1 & 2 & -3 \\ 5 & 0 & 2 \\ 1 & -1 & 1 \end{pmatrix}$, then verify that $A + (B + C) = (A + B) + C$.

18) An electronic company records each type of entertainment device sold at three of their branch stores so that they can monitor their purchases of supplies. The sales in two weeks are shown in the following spreadsheets.

		T.V.	DVD	Videogames	CD Players
Week I	Store I	30	15	12	10
	Store II	40	20	15	15
	Store III	25	18	10	12
Week II	Store I	25	12	8	6
	Store II	32	10	10	12
	Store III	22	15	8	10

Find the sum of the items sold out in two weeks using matrix addition

19) a) The fees structure for one-day admission to a swimming pool is as follows:

Member	Children	Adult
Before 2.00 p.m.	20	30
After 2.00 p.m.	30	40
Non-Member		
Before 2.00 p.m.	25	35
After 2.00 p.m.	40	50
Daily Admission Fees in (Rs)		

Write the matrix that represents the additional cost for non-membership.

(OR)

b) If $A = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$ and $I_2 = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$, then show that $A^2 - (a+d)A = (bc - ad)I_2$.

