CHAPTER-3 MATRICES 04 MARK TYPE QUESTIONS

Q. NO	QUESTION	MARK				
1.	On her birthday, Seema decided to donate some money to children of an orphanage	4				
	home. If there were 8 children less, everyone would have ot Rs.10 more. However, if there					
	were 16 children more, everyone would got Rs.10 less. Let the number of children be x					
	and the amount distributed by Seema for one child be y.					
	1. Find the equation related to the given problem in terms x and y.					
	2. find the number of children. How much amount is given to each child by seema?					
2.	Two farmers Ramakishan and Gurucharan singh cultivate only three varieties of rice	4				
	namely Basmati, Permal and Naura. The sale of these varieties of rice by both the farmers					
	in the month of September and October are given by the following matrices A and B.					
	September sales in Rupees:					
	$A = \begin{bmatrix} 10000 & 20000 & 30000 \\ 50000 & 20000 & 10000 \end{bmatrix}$					
	October sales in rupees					
	$B = \begin{bmatrix} 20000 & 10000 & 10000 \end{bmatrix}$					
	1. The total sales in September and October for each farmer in each variety can be					
	represented as					
	A) A+B B) A-B C) A>B D) A <b< th=""><th></th></b<>					
	2. What is the value of A_{23} ?					
	A) 10,000 B) 20,000 C) 30,000 D) 40,000					
	3. The decrease in sales from September to October is given by					
	A) A+B B) A-B C) A>B D) A <b< th=""><th></th></b<>					
	4. If Ramakishan receives 2% profit on gross sales, compute his profit for each variety sold					
	in October.					
	A) Rs.100, Rs.200, Rs.120 B) Rs.100, Rs.200, Rs.130					
	C) RS.100, RS.220, RS.120 D) RS.110, RS.200, RS.120					
3.	DIET PROBLEMS :-	4				
	Inere are 2 families A and B. There are 4 men, 6 women and 2 children in family A, and 2					
	men, 2 women 4 children in family B. The recommend daily amount of calories is 2200 for					
	men, 2500 for women, 2000 for children. Boprosont the above information using matrix					
	Women and 55 grams for children. Represent the above information using matrix.					
	each of the two families. What awareness can you create among people about the					
	nlanned diet from this question?					

4.	<image/> <section-header><text><text></text></text></section-header>	4
5.	Express the matrix $A = \begin{bmatrix} 2 & 4 & -6 \\ 7 & 3 & 5 \\ 1 & -2 & 4 \end{bmatrix}$ as the sum of a symmetric and skew-symmetric matrix.	4
6.	The sum of three numbers is 2. If we subtract the second number from twice the first number, we get 3. By adding double the second number and the third number we get 0. Represent it algebraically and find the numbers using matrix method.	4
7.	Express the following matrix as the sum of symmetric and a skew-symmetric matrix:	4

	$\begin{bmatrix} 3 & 3 & -1 \\ -2 & -2 & 1 \\ -4 & -5 & 2 \end{bmatrix}$	
8.	If, $A = \begin{bmatrix} 2 & 0 & 1 \\ 2 & 1 & 3 \\ 1 & -1 & 0 \end{bmatrix}$ find $A^2 - 5A + 16I$.	4
9.	Amit, Biju, Chirag are classmates. Each of them was asked to write a square matrix of order 2. They wrote the following matrices. $A = \begin{pmatrix} 1 & 2 \\ -1 & 3 \end{pmatrix} B = \begin{pmatrix} 4 & 0 \\ 1 & 5 \end{pmatrix} and c = \begin{pmatrix} 2 & 0 \\ 1 & -2 \end{pmatrix} . If a=4 and b=-2, based on the above information answer the following question: I) Find the sum of matrices A, B and C II) Find the value of A^TFind AC-BC.$	4
10.	Define Lower triangular matrix and upper triangular matrix? give example.	4
11.	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 $I + A = (I - A) \begin{bmatrix} \cos\alpha & -\sin\alpha \\ \sin\alpha & \cos\alpha \end{bmatrix}$.	4
12.	Find the value of x, if $\begin{bmatrix} 1 & x & 1 \end{bmatrix} \begin{bmatrix} 1 & 3 & 2 \\ 2 & 5 & 1 \\ 15 & 3 & 2 \end{bmatrix} \begin{bmatrix} 1 \\ 2 \\ x \end{bmatrix} = 0$	4
13.	Ram purchases 3 pens, 2 bags, and 1 instrument box and pays ₹ 41. From the same shop, Dheeraj purchases 2 pens, 1 bag, and 2 instrument boxes and pays ₹ 29, while Ankur purchases 2 pens, 2 bags, and 2 instrument boxes and pays ₹ 44.	
14.	Three friends Ravi, Raju and Rohit were buying and selling stationery items in a market. The price of per dozen of Pen, notebooks and toys are Rupees x, y and z respectively. Ravi purchases 4 dozen of notebooks and sells 2 dozen pens and 5 dozen toys. Raju purchases 2 dozen toys and sells 3 dozen pens and 1 dozen of notebooks. Rohit purchases one dozen of pens and sells 3 dozen notebooks and one dozen toys. In the process, Ravi, Raju and Rohit earn ₹ 1500, ₹ 100 and ₹400 respectively.	

	(i) What is the price of one dogon page? (1 mode)					
	 (i) What is the price of one dozen pens? (1 mark) (ii) What is the total price of one dozen pens and one dozen of notebooks? (1 mark) 					
	(iii) What is the sale amount of Ravi? (2 marks)					
15.	Three schools DPS, CVC and KVS decided to organize a fair for collecting money forhelping the flood victims. They sold handmade fans, mats and plates from recycled materialat a cost of Rs. 25, Rs.100 and Rs. 50 each respectively. The numbers of articles sold aregiven asSchool /ArticleDPSCVCKVSHandmade fans402535Mats504050Plates203040Based on the information given above, answer the following questions:	4				
	 (i). What is the total money (in Rupees) collected by the school DPS? (ii). If the number of handmade fans and plates are interchanged for all the schools, then what is the total money collected by all schools? (iii). How many articles (in total) are sold by three schools? 					
16.	 There are two families A and B. There are 4 men, 6 women and 2 children in family A and 2 men, 2 women and 4 children in family B. The recommended daily amount of calories is 2400 for men, 1900 for women and 1800 for children 45 grams of protein for men, 55 grams for women and 33 grams for children. (i) Represent the above information using matrices (ii) Calculate the total requirement of calories and proteins for each of the two families. 	4				

ANSWERS:

Q. NO	ANSWER				MARKS			
1.	1. 5x-4y=40 and 5x-8y=-80				2			
	2. x=32 and y =30				2			
2.	1- A 2-A 3-B 4-A					4		
3.	Ans:-							
	The given data can be represented as-							
	Family member:-	1		1		1		
	Men women Children							
	A	4		6		2		
	В	2		2		4]	
	Diet to in-take:-		1				,	
			Calories		protie	en		
	Men		2200		75			
	Women		2500		70			
	children		2000		35			
	This can be solved in	matrix	multiplication	as				
		ſ4 6	2]	$\begin{bmatrix} 27800 \\ 20 \end{bmatrix} = \begin{bmatrix} 27800 \end{bmatrix}$	790ן			
		l _{2 2}	4^{1} 2000 3	$\left \frac{1}{2} \right = \left \frac{1}{17400} \right $	430			
			12000					
	Thus family A require	d 2780	Ocalories and 7	790gms of prot	ein ; fa	mily B required		
	17400calories and 43	Ogms c	of protein.					
4.	Ans:-						4	
	Let us assume that th	e earni	ng of trust from	m all the charg	es is x a	and earning of trust		
	from the interest obt	ained f	rom the bank i	s y.				
	Total fund received is	RS.300	000					
	X= 2% of RS.15000 = 300							
	As matrix it can be represented as							
	$\begin{bmatrix} 1 & 1 \\ 1 & 0 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 1800 \\ 200 \end{bmatrix}$							
	$[x_1] [300]$							
	[y] = [1500]							
	Let R be the rate of interest by the bank							
	As y=1500 = $\frac{\pi}{100} X150$	00 = 1	.50 <i>i.e.</i> R	=10%				
	So, the rate of interest the trust get by the bank is 10%.							
5.	$\frac{1}{-}(A+A')+\frac{1}{-}(A-A')$)					4	
			_					
	$\begin{bmatrix} 2 & \frac{11}{2} & -\frac{5}{2} \end{bmatrix} \begin{bmatrix} 0 & -\frac{3}{2} & -\frac{7}{2} \end{bmatrix}$							
		2	$2 \mid \lceil 2 \mid 4 \mid$	-6]				
	$ \frac{11}{3} - \frac{3}{3} + \frac{3}{3} $	0	$\frac{7}{2} _{-} _{7} _{3}$	5				
		0	$2 \begin{bmatrix} - & - & - & - \\ - & - & - & - \\ 1 & - & - & - \\ - & - & - & - \\ - & - & -$					
	$\begin{vmatrix} -5 & 3 \\ 4 & -5 \end{vmatrix}$	_7	0	2 4]				
	$\begin{bmatrix} 2 & 2 \end{bmatrix} \begin{bmatrix} 2 & -1 \end{bmatrix}$	2						
6.	X+Y+Z=2						4	
	2X-Y=3							
	2Y+2=0							

	x = 1, y = -2, z = 2	
7.		4
	$A = \begin{bmatrix} -2 & -2 & 1 \end{bmatrix}$	
	$\begin{bmatrix} -4 & -5 & 2 \end{bmatrix}$	
	=P+Q	
	$\begin{bmatrix} 6 & 1 & -5 \end{bmatrix}$	
	$P = \frac{1}{2} \begin{bmatrix} 1 & -4 & -4 \end{bmatrix}$	
	L-5 -4 4	
	$0 - \frac{1}{5} 0 - $	
	$Q = -\frac{1}{2} -5 0 6$	
	L 3 6 UJ	
	Here Dis a symmetric matrix and O is show symmetric matrix	
	Here P is a symmetric matrix and Q is skew symmetric matrix	
0	(2 0 1)	
0.	$\begin{pmatrix} 2 & 0 & 1 \\ 2 & 1 & 2 \end{pmatrix}$	4
	$A = \begin{pmatrix} 2 & 1 & 3 \\ 1 & 1 & 0 \end{pmatrix}^{2}$	
	(1 - 1 0)	
	(5 -1 2)	
	$A^2 = \begin{pmatrix} 9 & -2 & 5 \\ 9 & -2 & 5 \end{pmatrix}$	
	$\begin{pmatrix} 0 & -1 & -2 \end{pmatrix}$	
	$A^2 - 5A + 16I$	
	(5 -1 2) $(2 0 1)$ $(1 0 0)$	
	=(9 -2 5) - 5(2 1 3) + 16(0 1 0)	
	$\begin{pmatrix} 0 & -1 & -2 \end{pmatrix}$ $\begin{pmatrix} 1 & -1 & 0 \end{pmatrix}$ $\begin{pmatrix} 0 & 0 & 1 \end{pmatrix}$	
	$\begin{pmatrix} 1 & -1 & -3 \end{pmatrix}$	
	$= \begin{pmatrix} -1 & -1 & -10 \end{pmatrix}$.	
	$(-5 \ 4 \ 4 \ /$	
9.	$A = \begin{pmatrix} 1 & 2 \\ -1 & 3 \end{pmatrix} B = \begin{pmatrix} 4 & 0 \\ 1 & 5 \end{pmatrix}$ and $c = \begin{pmatrix} 2 & 0 \\ 1 & -2 \end{pmatrix}$	4
	$\begin{pmatrix} -1 & 3 \end{pmatrix} \begin{pmatrix} 1 & 3 \end{pmatrix} \begin{pmatrix} 1 & 3 \end{pmatrix} \begin{pmatrix} 2 & 0 \end{pmatrix} \begin{pmatrix} 7 & 2 \end{pmatrix}$	
	$A+B+C=\begin{pmatrix} -1 & 3 \end{pmatrix}+\begin{pmatrix} 1 & 5 \end{pmatrix}+\begin{pmatrix} 1 & -2 \end{pmatrix}=\begin{pmatrix} 1 & 6 \end{pmatrix}$	
	$A^{T} = \begin{pmatrix} 1 & -1 \\ 2 & -2 \end{pmatrix}$	
	$\begin{pmatrix} 2 & 3 \\ -4 & -4 \end{pmatrix} = \begin{pmatrix} 8 & 0 \\ -4 & -4 \end{pmatrix}$	
	$\frac{A - b - \left(1 - 6\right)^{-} \left(7 - 10\right)^{-} \left(-6 - 4\right)}{4}$	
10.	A square matrix in which all the elements above the diagonal elements are zero is a lower triangular matrix	4
	[5 0 0]	
	Ex: $A = \begin{bmatrix} 1 & -3 & 0 \end{bmatrix}$	
	L2 4 2J A square matrix in which all the elements below the diagonal elements are zero is a upper	
	triangular matrix.	
	Ex: 0 2 3 0 0 3 0 0 3 0 0 3 0 0	
	Ex: $\begin{bmatrix} 0 & 2 & 3 \\ 0 & 0 & 2 \end{bmatrix}$	
I		

11. L.H.S. = I + A = $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ + $\begin{bmatrix} 0 & -\tan\frac{\alpha}{2} \\ \tan\frac{\alpha}{2} & 0 \end{bmatrix}$ = $\begin{bmatrix} 1 & -\tan\frac{\alpha}{2} \\ \tan\frac{\alpha}{2} & 1 \end{bmatrix}$ I - A = $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ - $\begin{bmatrix} 0 & -\tan\frac{\alpha}{2} \\ \tan\frac{\alpha}{2} & 0 \end{bmatrix}$ = $\begin{bmatrix} 1 & \tan\frac{\alpha}{2} \\ -\tan\frac{\alpha}{2} & 1 \end{bmatrix}$ R.H.S. = $(I - A) \begin{bmatrix} \cos\alpha & -\sin\alpha \\ \sin\alpha & \cos\alpha \end{bmatrix}$ = $\begin{bmatrix} 1 & \tan\frac{\alpha}{2} \\ -\tan\frac{\alpha}{2} & 1 \end{bmatrix} \begin{bmatrix} \cos\alpha & -\sin\alpha \\ \sin\alpha & \cos\alpha \end{bmatrix}$ = $\begin{bmatrix} 1 & -\tan\frac{\alpha}{2} \\ \tan\frac{\alpha}{2} & 1 \end{bmatrix}$ Hence, L.H.S. = R.H.S. Verified	4
12. $\begin{bmatrix} 1 & x & 1 \end{bmatrix} \begin{bmatrix} 1 & 3 & 2 \\ 2 & 5 & 1 \\ 15 & 3 & 2 \end{bmatrix} \begin{bmatrix} 1 \\ 2 \\ x \end{bmatrix} = 0$ Or, $\begin{bmatrix} 1+2x+15 & 3+5x+3 & 2+x+2 \end{bmatrix} \begin{bmatrix} 1 \\ 2 \\ x \end{bmatrix} = 0$ Or, $\begin{bmatrix} x^2 + 16x+28 \end{bmatrix} = 0$ Or, $\begin{bmatrix} x^2 + 16x+28 \end{bmatrix} = 0$ Or, $\begin{bmatrix} x + 16x+28 = 0 \\ 0r, x + 2)(x + 14) = 0$ Or, $x = -2, -14$	4
13. (i) ₹ 2 (ii) ₹17 (iii) ₹7	1+1+2
14. (i) ₹ 100 (ii) ₹ 300 (iii) ₹ 1200	1+1+2
 15. (i) Total money collected by the school DPS is Rs. 7000 (ii) Total money collected by all the schools is Rs. 18500 (iii) The total articles sold by the schools is 330 	4
16. (i) The matrices are $P = \begin{bmatrix} 4 & 6 & 2 \\ 2 & 2 & 4 \end{bmatrix} Q = \begin{bmatrix} 2400 \\ 1900 \\ 1800 \end{bmatrix}$ and $R = \begin{bmatrix} 45 \\ 55 \\ 33 \end{bmatrix}$ (ii) Here $PQ = \begin{bmatrix} 4 & 6 & 2 \\ 2 & 2 & 4 \end{bmatrix} \begin{bmatrix} 2400 \\ 1900 \\ 1800 \end{bmatrix}$ $= \begin{bmatrix} 24600 \\ 15800 \end{bmatrix}$ And $PR = \begin{bmatrix} 4 & 6 & 2 \\ 2 & 2 & 4 \end{bmatrix} \begin{bmatrix} 45 \\ 55 \\ 33 \end{bmatrix}$ $= \begin{bmatrix} 576 \\ 332 \end{bmatrix}$ Hence total requirement of calories and protein for family A are 24600 and 576 grams respectively and total requirement of calories and protein for family B are 15800 and 332 grams respectively.	4