Q.No.14: A dealer sells three items X, Y and Z in 3 different cities Delhi, Agra and Lucknow. Annual sales of X, Y and Z in Delhi are 2000, 3500, 1800 respectively and in Agra, it is 1500, 2800, 1600 respectively whereas, in Lucknow, it is 1800, 3200, 2000 respectively.
If the unit sales price of X, Y and Z are ₹5, ₹6 and ₹4.50 respectively and the unit cost price of the above three items are ₹4, ₹4.50 and ₹4 respectively.
Based on the above information, answer the following question:
(i) Which of the following matrices represent the cost price matrix?

(a) $\begin{bmatrix} ₹29,200 \\ ₹26,550 \\ ₹28,000 \end{bmatrix}$

(b) $\begin{bmatrix} ₹30,950 \\ ₹25,000 \\ ₹29,600 \end{bmatrix}$

(c) $\begin{bmatrix} ₹39,100 \\ ₹31,500 \\ ₹37,200 \end{bmatrix}$

(d) $\begin{bmatrix} ₹36,500 \\ ₹35,400 \\ ₹31,500 \end{bmatrix}$

(ii) Which of the following matrices represent the sales price matrix?

(a) $\begin{bmatrix} ₹36,500 \\ ₹35,400 \\ ₹31,500 \end{bmatrix}$

(b) $\begin{bmatrix} ₹39,100 \\ ₹31,500 \\ ₹37,200 \end{bmatrix}$

(c) $\begin{bmatrix} ₹30,950 \\ ₹25,000 \\ ₹29,600 \end{bmatrix}$

(d) $\begin{bmatrix} ₹29,200 \\ ₹26,550 \\ ₹28,000 \end{bmatrix}$

(iii) What is the total profit occurred by the dealer in all cities?
(a) ₹7,600
(b) ₹8,150
(c) ₹21,750

(d) ₹22,250
(iv) What is the total revenue of all items in Agra?
(a) ₹6,500
(b) ₹7,600
(c) ₹8,150
(d) ₹8,510
(v) What is the difference in total revenues of all items in Lucknow and Delhi?
(a) ₹1,650
(b) ₹1,100
(c) ₹550
(d) ₹450

Q.No.15: Three people A, B and C are playing a game of Ludo at home during the national lockdown due to the pandemic situation of Covid-19. While rolling the dice, B observed and noted the possible outcomes of the throw every time belongs to set {1, 2, 3, 4, 5, 6}. Let X be the set of players while Y be the set of all possible outcomes. Then, X = {A, B, C} and Y = {1, 2, 3, 4, 5, 6}.
Based on the above information, answer the following question:
(i) What is the number of relations from X to Y?
(a) 2^8
(b) 2^9
(c) 2^{16}
(d) 2^{18}
(ii) If R : Y → Y be a relation defined as R = {(x, y) : y is double of x}, then which of the following is true regarding the relation R?
(a) Reflexive only
(b) Reflexive and transitive but not symmetric
(c) Reflexive and symmetric but not transitive
(d) Not reflexive, symmetric or transitive
(iii) Let R : X → X be defined by R = {(x, y) : x and y have same age}. Then, relation R is _____.
(a) reflexive only
(b) not reflexive but symmetric and transitive
(c) reflexive and symmetric but not transitive
(d) an equivalence relation
(iv) Person A wants to know the number of functions from X to Y. How many number of functions are possible?
(a) 64
(b) 216
(c) 729
(d) None of these
(v) Let R : X → Y, R = {(A, 2), (C, 4), (B, 3), (A, 1), (B, 5)}, then R is _____.
(a) neither one-one nor onto
(b) one-one but not onto
(c) onto but not one-one

(d) not a function

Q.No.16: A manufacturer sells three items A, B and C in three different cities Kanpur, Meerut and Prayagraj. Monthly sales of items in Kanpur are 120, 150, 135 respectively and in Meerut, it is 115, 140, 150 respectively whereas, in Prayagraj, it is 125, 135, 140 respectively. The unit sales price of items A, B and C are ₹10, ₹15 and ₹12 respectively and the unit cost price are ₹7, ₹10 and ₹8 respectively.

Based on the above information, answer the following question:

(i) What is the sales price matrix associated with the given situation?

(a) $\begin{bmatrix} ₹3420 \\ ₹3405 \\ ₹3345 \end{bmatrix}$

(b) $\begin{bmatrix} ₹5070 \\ ₹5050 \\ ₹4955 \end{bmatrix}$

(c) $\begin{bmatrix} ₹5275 \\ ₹5555 \\ ₹4705 \end{bmatrix}$

(d) $\begin{bmatrix} ₹6455 \\ ₹5785 \\ ₹5200 \end{bmatrix}$

(ii) What is the cost price matrix associated with the given situation?

(a) $\begin{bmatrix} ₹3420 \\ ₹3405 \\ ₹3345 \end{bmatrix}$

(b) $\begin{bmatrix} ₹5070 \\ ₹5050 \\ ₹4955 \end{bmatrix}$

(c) $\begin{bmatrix} ₹5275 \\ ₹5555 \\ ₹4705 \end{bmatrix}$

(d) $\begin{bmatrix} ₹6455 \\ ₹5785 \\ ₹5200 \end{bmatrix}$

(iii) What is the total monthly profit earned by the manufacturer in all cities?

(a) ₹4365

(b) ₹4555
(c) ₹4905
(d) ₹5125
(iv) What is the total annual revenue on all items sold in Meerut?
(a) ₹19,800
(b) ₹19,740
(c) ₹19,320
(d) ₹19,060
(v) What percent of revenue is generated by Kanpur and Prayagraj?
(a) 66.5%
(b) 62.5%
(c) 55.5%
(d) 51.5%

Q.No.17: A mess worker mixes together two types of food A and B, in such a way that the mixture contains at least 5 units of vitamins, 8 units of proteins, and 10 units of minerals. One kg of food A costs ₹60 and one kg of food B costs ₹72. The content in 1 kg of food, vitamin, protein and mineral is given as

	Vitamin	**Protein**	**Mineral**
Food A	2	1	2
Food B	3	2	1

Let *x* kg of food A and *y* kg of food B are mixed together to make the mixture. Then, the given LPP is formulated as:
Maximize $Z = 60x + 72y$
Subject to constraints:
$2x + 3y \geq 5$
$x + 2y \geq 8$
$2x + y \geq 10$
$x \geq 0$ and $y \geq 0$
Based on the above information, answer the following question:
(i) What is the point of intersection of the lines that represents Proteins and Minerals?
(a) $(4, 2)$
(b) $(4, 4)$
(c) $(2, 4)$
(d) $(2, 2)$
(ii) Which of the following are the corner points of the feasible region?
(a) (0, 4), (4, 2) and (2.5, 0)
(b) (0, 10), (4, 2) and (8, 0)
(c) (0, 4), (4, 2) and (8, 0)
(d) (0, 10), (4, 2) and (2.5, 0)
(iii) Which of the following points does not lie in the feasible region?
(a) (10, 0)

(b) (5, 0)
(c) (10, 5)
(d) (5, 5)
(iv) What is the optimum value for the given objective function *Z*?
(a) (0, 10)
(b) (4, 2)
(c) (8, 0)
(d) (0, 4)
(v) To minimize the cost, how much is the total mixture of Food A and B?
(a) 2 kg
(b) 4 kg
(c) 6 kg
(d) 10 kg