

Miscellaneous Exercise on Chapter 11

3. 90° 4. $\frac{x}{1} = \frac{y}{0} = \frac{z}{0}$ 5. 0°
6. $k = \frac{-10}{7}$ 7. $\vec{r} = \hat{i} + 2\hat{j} + 3\hat{k} + \lambda(\hat{i} + 2\hat{j} - 5\hat{k})$
8. $x + y + z = a + b + c$ 9. 9
10. $\left(0, \frac{17}{2}, \frac{-13}{2}\right)$ 11. $\left(\frac{17}{3}, 0, \frac{23}{3}\right)$ 12. $(1, -2, 7)$
13. $7x - 8y + 3z + 25 = 0$ 14. $p = \frac{3}{2}$ or $\frac{11}{6}$ or $\frac{7}{3}$
15. $y - 3z + 6 = 0$ 16. $x + 2y - 3z - 14 = 0$
17. $33x + 45y + 50z - 41 = 0$ 18. 13
19. $\vec{r} = \hat{i} + 2\hat{j} + 3\hat{k} + \lambda(-3\hat{i} + 5\hat{j} + 4\hat{k})$
20. $\vec{r} = \hat{i} + 2\hat{j} - 4\hat{k} + \lambda(2\hat{i} + 3\hat{j} + 6\hat{k})$ 22. D
23. B

EXERCISE 12.1

- Maximum $Z = 16$ at $(0, 4)$
- Minimum $Z = -12$ at $(4, 0)$
- Maximum $Z = \frac{235}{19}$ at $\left(\frac{20}{19}, \frac{45}{19}\right)$
- Minimum $Z = 7$ at $\left(\frac{3}{2}, \frac{1}{2}\right)$
- Maximum $Z = 18$ at $(4, 3)$
- Minimum $Z = 6$ at all the points on the line segment joining the points $(6, 0)$ and $(0, 3)$.
- Minimum $Z = 300$ at $(60, 0)$;
Maximum $Z = 600$ at all the points on the line segment joining the points $(120, 0)$ and $(60, 30)$.

8. Minimum $Z = 100$ at all the points on the line segment joining the points $(0, 50)$ and $(20, 40)$;
Maximum $Z = 400$ at $(0, 200)$
9. Z has no maximum value
10. No feasible region, hence no maximum value of Z .

EXERCISE 12.2

1. Minimum cost = Rs 160 at all points lying on segment joining $\frac{8}{3}, 0$ and $2, \frac{1}{2}$.
2. Maximum number of cakes = 30 of kind one and 10 cakes of another kind.
3. (i) 4 tennis rackets and 12 cricket bats
(ii) Maximum profit = Rs 200
4. 3 packages of nuts and 3 packages of bolts; Maximum profit = Rs 73.50.
5. 30 packages of screws A and 20 packages of screws B; Maximum profit = Rs 410
6. 4 Pedestal lamps and 4 wooden shades; Maximum profit = Rs 32
7. 8 Souvenir of types A and 20 of Souvenir of type B; Maximum profit = Rs 160.
8. 200 units of desktop model and 50 units of portable model; Maximum profit = Rs 1150000.
9. Minimise $Z = 4x + 6y$
subject to $3x + 6y \geq 80$, $4x + 3y \geq 100$, $x \geq 0$ and $y \geq 0$, where x and y denote the number of units of food F_1 and food F_2 respectively; Minimum cost = Rs 104
10. 100 kg of fertiliser F_1 and 80 kg of fertiliser F_2 ; Minimum cost = Rs 1000
11. (D)

Miscellaneous Exercise on Chapter 12

1. 40 packets of food P and 15 packets of food Q; Maximum amount of vitamin A = 285 units.
2. 3 bags of brand P and 6 bags of brand Q; Minimum cost of the mixture = Rs 1950
3. Least cost of the mixture is Rs 112 (2 kg of Food X and 4 kg of food Y).

5. 40 tickets of executive class and 160 tickets of economy class; Maximum profit = Rs 136000.
6. From A : 10,50, 40 units; From B: 50,0,0 units to D, E and F respectively and minimum cost = Rs 510
7. From A: 500, 3000 and 3500 litres; From B: 4000, 0, 0 litres to D, E and F respectively; Minimum cost = Rs 4400
8. 40 bags of brand P and 100 bags of brand Q; Minimum amount of nitrogen = 470 kg.
9. 140 bags of brand P and 50 bags of brand Q; Maximum amount of nitrogen = 595 kg.
10. 800 dolls of type A and 400 dolls of type B; Maximum profit = Rs 16000

EXERCISE 13.1

1. $P(E|F) = \frac{2}{3}$, $P(F|E) = \frac{1}{3}$
2. $P(A|B) = \frac{16}{25}$
3. (i) 0.32 (ii) 0.64 (iii) 0.98
4. $\frac{11}{26}$
5. (i) $\frac{4}{11}$ (ii) $\frac{4}{5}$ (iii) $\frac{2}{3}$
6. (i) $\frac{1}{2}$ (ii) $\frac{3}{7}$ (iii) $\frac{6}{7}$
7. (i) 1 (ii) 0
8. $\frac{1}{6}$ 9. 1 10. (a) $\frac{1}{3}$, (b) $\frac{1}{9}$
11. (i) $\frac{1}{2}, \frac{1}{3}$ (ii) $\frac{1}{2}, \frac{2}{3}$ (iii) $\frac{3}{4}, \frac{1}{4}$
12. (i) $\frac{1}{2}$ (ii) $\frac{1}{3}$ 13. $\frac{5}{9}$
14. $\frac{1}{15}$ 15. 0 16. C 17. D