

જવાબો

(જે દાખલામાં ગણતરી કરવાની હોય તેના જ જવાબો આપ્યા છે.)

સ્વાધ્યાય 1.1

- 1.** (1) સ્વવાચક નથી, સંમિત નથી, પરંપરિત નથી. (2) સ્વવાચક છે, સંમિત નથી, પરંપરિત છે.
 (3) સ્વવાચક છે, સંમિત નથી, પરંપરિત છે. (4) સ્વવાચક, સંમિત, પરંપરિત છે.
 (5) સ્વવાચક નથી, સંમિત નથી, પરંપરિત નથી.
- 2.** સાભ્ય વગ્ઝો : $A_1 = \{..., 1, 7, 13, 19, ...\}$
 $A_2 = \{..., 2, 8, 14, 20, ...\}$
 $A_3 = \{..., 3, 9, 15, 21, ...\}$
 $A_4 = \{..., 4, 10, 16, 22, ...\}$
 $A_5 = \{..., 5, 11, 17, 23, ...\}$
 $A_6 = \{..., 6, 12, 18, 24, ...\}$
- 3.** સ્વવાચક, વિસંમિત, પરંપરિત છે. **4.** (1) {1}, {2}, {3}, ..., (2) {0}, {1, -1}, {2, -2}, ...
5. {(1, 2)} **6.** X-અક્ષ, Y-અક્ષ અને તેમને સમાંતર રેખાઓનો ગણ

સ્વાધ્યાય 1.2

- 1.** f એક-એક, વ્યાપ્ત છે.
- 3.** f એક-એક નથી, વ્યાપ્ત નથી.
- 5.** f એક-એક નથી, વ્યાપ્ત છે.
- 7.** f એક-એક નથી, વ્યાપ્ત છે.
- 9.** f એક-એક છે, વ્યાપ્ત નથી.
- 11.** f એક-એક નથી, વ્યાપ્ત નથી.
- 13.** A_1 પર વ્યાપ્ત વિધ્યોની સંખ્યા 1
 A_2 પર વ્યાપ્ત વિધ્યોની સંખ્યા 2
 A_3 પર વ્યાપ્ત વિધ્યોની સંખ્યા 6, વ્યાપક રીતે A_n પર વ્યાપ્ત વિધ્યોની સંખ્યા $n!$
- 2.** f એક-એક અને વ્યાપ્ત છે.
- 4.** f એક-એક નથી, વ્યાપ્ત નથી.
- 6.** f એક-એક અને વ્યાપ્ત છે.
- 8.** f એક-એક અને વ્યાપ્ત છે.
- 10.** f એક-એક છે, વ્યાપ્ત છે.
- 12.** $n!$ એક-એક વિધ્યો

સ્વાધ્યાય 1.3

- 2.** (1) $(gof)(x) = x^2$, $(fog)(x) = x^2$ (2) $(gof)(x) = x$, $(fog)(x) = x$
- 3.** $(fof)(x) = x$ **4.** $(fof)(x) = x^4 - 2x^3 - 4x^2 + 5x + 4$
- 5.** $(fof)(x) = x$ **6.** $(fog)(x) = \begin{cases} 1, & x \geq 1 \\ 0, & x \in [0, 1) \\ -1, & x < 0 \end{cases}$ **(gof)(x) =** $\begin{cases} 1, & x > 0 \\ 0, & x = 0, gof = f \\ -1, & x < 0 \end{cases}$
- 7.** $(fog)(n) = \begin{cases} 2n + 2, & n યુગ્મ \\ \frac{n+3}{2}, & n અયુગ્મ, n = 4k + 1, k \in \mathbb{Z} \\ n - 2, & n અયુગ્મ, n = 4k + 3, k \in \mathbb{Z} \end{cases}$ **(gof)(n) =** $\begin{cases} 2n + 4, & n યુગ્મ \\ n - 1, & n અયુગ્મ \end{cases}$

સ્વાધ્યાય 1.4

- 1.** $f^{-1}(x) = \frac{x-3}{2}$ **2.** $f^{-1}(x) = x + 7$ **3.** $f^{-1}(x) = x^{\frac{1}{3}}$ **4.** $f^{-1}(n) = \frac{n}{2}$

5. $f^{-1}((n, 0)) = 2n$, $f^{-1}((n, 1)) = 2n + 1$ 6. f^{-1} શક્ય નથી.
9. (1) f^{-1} ના મળે. (2) f^{-1} ના મળે. (3) f^{-1} ના મળે.
- (4) f^{-1} ના મળે. (5) $f^{-1}(z) = \bar{z}$ (6) f^{-1} ના મળે.
- (7) $f^{-1}((n, m)) = (m, n)$, $f^{-1} = f$

સ્વાધ્યાય 1

4. S સ્વવાચક નથી, સંમિત નથી, પરંપરિત નથી.

8. (1) એક-એક નથી, વ્યાપ્ત નથી. (2) એક-એક નથી, વ્યાપ્ત છે.
- (3) એક-એક નથી, વ્યાપ્ત નથી. (4) એક-એક નથી, વ્યાપ્ત છે.
- (5) એક-એક નથી, વ્યાપ્ત છે. (6) એક-એક છે, વ્યાપ્ત નથી.
- (7) એક-એક છે, વ્યાપ્ત છે. (8) એક-એક છે, વ્યાપ્ત છે.
- (9) એક-એક નથી, વ્યાપ્ત નથી. (10) એક-એક છે, વ્યાપ્ત છે.
- (11) એક-એક નથી, વ્યાપ્ત નથી.

10. $(gof)(n) = n$, જો $5 | n$ તો $(fog)(n) = n$. અન્યથાં $(fog)(n) = 0$

14. fog ના મળે

16. f એક-એક છે, વ્યાપ્ત છે, $f^{-1}(x) = \frac{1}{2} \log_{10}\left(\frac{1+x}{1-x}\right)$ 17. f^{-1} ના મળે. f વ્યાપ્ત નથી.

18. $a * b = a + b + ab$ તો $*$ સમક્રમી છે અને જૂથના નિયમનું પાલન કરે છે. જો $a * b = a - b + ab$ તો $*$ સમક્રમી નથી અને જૂથના નિયમનું પાલન ન કરે.

19. (1) જૂથનો નિયમ નથી, કમનો નિયમ નથી. (2) જૂથનો નિયમ છે, કમનો નિયમ છે.
- (3) જૂથનો નિયમ નથી, કમનો નિયમ નથી. (4) જૂથનો નિયમ નથી, કમનો નિયમ નથી.
- (5) જૂથનો નિયમ છે, કમનો નિયમ છે. (6) કમનો નિયમ નથી, જૂથનો નિયમ નથી.
- (7) કમનો નિયમ છે, જૂથનો નિયમ નથી. (8) કમનો નિયમ નથી, જૂથનો નિયમ નથી.
- (9) કમનો નિયમ છે, જૂથનો નિયમ છે. (10) કમનો નિયમ નથી, જૂથનો નિયમ નથી.

20. (1) $e = 0$, $a^{-1} = -\frac{a}{1+a}$ (2) $e = 2$, $a^{-1} = \frac{4}{a}$ (3) $e = 2$, $a^{-1} = 4 - a$ (4) $e = 0$, $a^{-1} = \frac{a}{a-1}$
 (5) e ના મળે (6) e ના મળે (7) e ના મળે. (8) e ના મળે. (9) X એકમ ઘટક છે. $X^{-1} = X$
 (10) \emptyset એકમ ઘટક છે. $\emptyset^{-1} = \emptyset$

21. વિભાગ A : (1) d (2) b (3) b (4) a (5) a (6) c (7) b (8) a (9) b (10) a
 (11) b (12) c (13) c (14) a (15) a

વિભાગ B : (16) a (17) b (18) a (19) a (20) b (21) b (22) d (23) a (24) b
 (25) a (26) b (27) a

વિભાગ C : (28) c (29) b (30) b (31) c (32) b (33) a (34) a (35) a (36) d
 (37) d (38) c (39) d

સ્વાધ્યાય 2.1

1. (1) $\frac{\pi}{6}$ (2) $-\frac{\pi}{6}$ (3) $\frac{2\pi}{3}$ (4) $-\frac{\pi}{3}$ (5) $\frac{\pi}{6}$ (6) $-\frac{\pi}{4}$ 2. (1) $\frac{5\pi}{14}$ (2) $\frac{3\pi}{10}$ (3) $\frac{\pi}{4}$ (4) $\frac{3\pi}{8}$
3. (1) $\frac{20}{29}$ (2) $\frac{1}{5}$ (3) $\frac{24}{25}$ (4) $\frac{7-3\sqrt{5}}{2}$ (5) $\frac{23}{27}$ 4. $\frac{\pi}{4} - x$

સ્વાધ્યાય 2.2

1. (1) 0 (2) $\frac{7\pi}{6}$ (3) $\frac{5\pi}{12}$ (4) 7π (5) 2 (6) 1 (7) $\frac{5\pi}{6}$

સ્વાધ્યાય 2

3. (1) $\left\{ \pm \frac{1}{\sqrt{2}} \right\}$ (2) $\left\{ \frac{1}{6} \right\}$ (3) $\left\{ \frac{\pi}{4} \right\}$ (4) $\left\{ \frac{1}{2} \right\}$ (5) {13} (6) $\left\{ \frac{1}{4} \right\}$ (7) {4}
4. વિભાગ A : (1) a (2) b (3) a (4) b (5) d (6) d (7) b (8) b (9) a (10) c
 (11) a (12) c (13) d (14) b (15) d
- વિભાગ B : (16) c (17) b (18) d (19) c (20) b (21) d (22) d (23) b (24) a
 (25) a (26) c (27) d (28) a (29) d (30) b
- વિભાગ C : (31) b (32) a (33) a (34) d (35) d (36) d (37) b (38) b (39) a
 (40) c (41) c (42) c
- વિભાગ D : (43) d (44) c (45) b (46) b (47) b (48) b (49) b (50) b (51) b

સ્વાધ્યાય 3.1

1. (1) 43 (2) 1 (3) 3 2. (1) 2 (2) 6, -2 3. (1) 0 (2) 131

સ્વાધ્યાય 3.2

3. $4, \frac{-23}{21}$ 5. $\frac{7\pi}{24}, \frac{11\pi}{24}$ 7. 4

સ્વાધ્યાય 3.3

1. (1) $\{(0, 0), (7, 7)\}$ (2) $\left\{ \left(\frac{-39}{7}, \frac{-79}{7} \right) \right\}$ (3) $\left\{ \left(1, \frac{1}{2} \right) \right\}$ 2. -28 3. -37
 4. (1) 25 (2) 4 5. $k = 3; 7$ 6. $a \in \mathbb{R}$
 7. (1) $3x + 2y - 5 = 0$ (2) $x = 5$ (3) $x - 4y - 13 = 0$ 8. 1

સ્વાધ્યાય 3

1. $x = \frac{-5}{3}$ 2. $x = -1, -2$ 3. $x = 2$ 4. $x = -7$
 10. (1) b (2) c (3) d (4) b (5) d (6) d (7) c (8) b (9) b (10) c (11) b
 (12) a (13) d (14) d (15) d (16) b

સ્વાધ્યાય 4.1

$$1. \quad A + B = \begin{bmatrix} -1 & -3 \\ 3 & 7 \\ 3 & -1 \end{bmatrix}, \quad A - B = \begin{bmatrix} 5 & -5 \\ 3 & -3 \\ -5 & 3 \end{bmatrix}, \quad 2A + B = \begin{bmatrix} 1 & -7 \\ 6 & 9 \\ 2 & 0 \end{bmatrix}, \quad A - 2B = \begin{bmatrix} 8 & -6 \\ 3 & -8 \\ -9 & 5 \end{bmatrix}$$

$$2. \quad A + A^T = \begin{bmatrix} 2\sin\theta & 0 \\ 0 & 2\sin\theta \end{bmatrix}, \quad A - A^T = \begin{bmatrix} 0 & -2\cos\theta \\ 2\cos\theta & 0 \end{bmatrix}$$

$$3. \quad B - A = diag[2 \ 3 \ -1], \quad 2A + 3B = diag[11 \ 4 \ 7] \quad 4. \quad x = 1 \ અથવા 7; \quad y = -2 \ અથવા 6$$

5. $\begin{bmatrix} \frac{1}{3} & 3 \\ 0 & \frac{4}{3} \end{bmatrix}$ 6. $\begin{bmatrix} -1 & -8 & -1 \\ 1 & -1 & 1 \\ -7 & -2 & -4 \end{bmatrix}$ 7. $x = 2, y = 4$; $x = 4, y = 2$

8. $a = 4, b = 1, c = 2, d = -2$ 9. $A = \begin{bmatrix} 4 & 4 \\ 4 & 0 \end{bmatrix}, B = \begin{bmatrix} -2 & 1 \\ 5 & 0 \end{bmatrix}$ 10. $\begin{bmatrix} 12 & \frac{4}{3} \\ 4 & -\frac{14}{3} \\ \frac{25}{3} & \frac{28}{3} \end{bmatrix}$

11. $\begin{bmatrix} 17 & -1 & 3 \\ -24 & -1 & -16 \\ -7 & 1 & 0 \end{bmatrix}$ 12. $a = 2, b = -8$.

સ્વાધ્યાય 4.2

2. $a = 2, b = 4, c = 1, d = 3$ 4. $AB = [1], BA = \begin{bmatrix} 2 & -2 & 4 \\ 3 & -3 & 6 \\ 1 & -1 & 2 \end{bmatrix}$ 5. $\begin{bmatrix} -5 & -1 & -3 \\ -1 & -7 & -10 \\ -5 & 4 & -2 \end{bmatrix}$
 6. $\begin{bmatrix} -7 & 0 \\ 0 & -7 \end{bmatrix}$ 8. $\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$ 9. $X = \begin{bmatrix} 1 & 4 & 5 \\ 4 & 5 & \frac{13}{2} \\ 5 & \frac{13}{2} & 8 \end{bmatrix}, Y = \begin{bmatrix} 0 & 2 & 2 \\ -2 & 0 & \frac{5}{2} \\ -2 & \frac{-5}{2} & 0 \end{bmatrix}$
 10. $\begin{bmatrix} 1 & -4 \\ 3 & -2 \end{bmatrix}$ 11. $x = \pm \frac{1}{\sqrt{2}} = y$ 12. $-2, -14$

સ્વાધ્યાય 4.3

1. (1) $\begin{bmatrix} -3 & 2 \\ -1 & 5 \end{bmatrix}$ (2) $\begin{bmatrix} d & -c \\ -b & a \end{bmatrix}$ (3) $\begin{bmatrix} -22 & 11 & -11 \\ 4 & -2 & 2 \\ 16 & -8 & 8 \end{bmatrix}$ (4) $\begin{bmatrix} -5 & 11 & 6 \\ 4 & -9 & -5 \\ -8 & 17 & 10 \end{bmatrix}$
 2. $\begin{bmatrix} -\frac{1}{2} & 0 & \frac{1}{2} \\ \frac{5}{4} & -\frac{1}{2} & -\frac{1}{4} \\ \frac{1}{4} & \frac{1}{2} & -\frac{1}{4} \end{bmatrix}$ 7. $x = 3$
 8. (1) $\begin{bmatrix} \frac{1}{5} & \frac{2}{5} \\ \frac{2}{5} & -\frac{1}{5} \end{bmatrix}$ (2) $\begin{bmatrix} 7 & -3 \\ -2 & 1 \end{bmatrix}$ (3) $\begin{bmatrix} \frac{1}{2} & -\frac{1}{2} & \frac{1}{2} \\ -4 & 3 & -1 \\ \frac{5}{2} & -\frac{3}{2} & \frac{1}{2} \end{bmatrix}$ (4) $\begin{bmatrix} 3 & 2 & 6 \\ 1 & 1 & 2 \\ 2 & 2 & 5 \end{bmatrix}$
 9. (1) $\{(1, -2)\}$ (2) $\left\{\left(\frac{11}{24}, \frac{1}{24}\right)\right\}$ 10. (1) $\{(1, 2, 3)\}$ (2) $\left\{\left(\frac{9}{5}, \frac{2}{5}, \frac{7}{5}\right)\right\}$

સ્વાધ્યાય 4

1. I 3. $\begin{bmatrix} \frac{-61}{2} & \frac{47}{2} \\ \frac{87}{2} & \frac{-67}{2} \end{bmatrix}$ 4. $\begin{bmatrix} 52 & -26 & -21 \\ -42 & 21 & 17 \\ 83 & -41 & -34 \end{bmatrix}$ 5. $\begin{bmatrix} 1 & 0 \\ 0 & 6 \end{bmatrix}$ 6. $A^{-1} = \frac{1}{17} \begin{bmatrix} 4 & 3 \\ -3 & 2 \end{bmatrix}$ 8. $\frac{1}{11} \begin{bmatrix} -3 & 4 & 5 \\ 9 & -1 & -4 \\ 5 & -3 & -1 \end{bmatrix}$
 9. $\begin{bmatrix} 36 & 0 \\ 0 & 36 \end{bmatrix}$ 10. (1) $\{(2, 1)\}$ (2) $\{(-1, 2)\}$ 11. (1) $\{(1, 1, -1)\}$ (2) $\left\{\left(\frac{1}{2}, \frac{1}{3}, \frac{1}{5}\right)\right\}$

12. $\begin{bmatrix} a^2 & ab \\ ac & bc+1 \end{bmatrix}$ 13. $x = \left\{ \left(\frac{c_1 - c_2}{m_2 - m_1}, \frac{m_2 c_1 - m_1 c_2}{m_2 - m_1} \right) \right\}$ 14. $x = 6$ 15. $x = \pm 4\sqrt{3}$
24. (1) d (2) c (3) c (4) d (5) b (6) a (7) d (8) b (9) b (10) a (11) b
 (12) c (13) c (14) b (15) c (16) b (17) a

स्वाध्याय 5.1

4. $x = 2$ माटे असतत 5. सतत 6. सतत 7. $x = 0$ माटे असतत 8. सतत 9. $x = 0$ माटे असतत
 10. $x = 0$ माटे असतत 11. सतत 12. सतत 13. $k = 3$ 14. $k = 5$ 15. $k = 1$
 16. $k = 0$ 17. $a = 4, b = -1$ 26. असतत 27. $k = \sqrt{2}$ 28. $n = 5$

स्वाध्याय 5.2

4. (1) $2\sin x \cos x$ (2) $2\tan x \sec^2 x$ (3) $4x^3$ (4) $-4\cos^3 x \sin x$

स्वाध्याय 5.3

1. $6\sin^2(2x + 3) \cdot \cos(2x + 3)$ 2. $3\tan^2 x \cdot \sec^2 x$ 3. $\sin^2 x \cdot \cos^4 x (3\cos^2 x - 5\sin^2 x)$
 4. $-2\sin(\sin(\sec(2x + 3))) \cdot \cos(\sec(2x + 3)) \cdot \sec(2x + 3) \cdot \tan(2x + 3)$
 5. $-(3x^2 - 1) \cdot \sec(\cot(x^3 - x + 2)) \cdot \tan(\cot(x^3 - x + 2)) \cdot \operatorname{cosec}^2(x^3 - x + 2)$
 7. $(2x + 3)^m - 1 \cdot (3x + 2)^n - 1 \cdot [6(m + n)x + 4m + 9n]$
 8. $n(\sin^n - 1 x \cdot \cos x + \cos^n - 1 \cdot \sin x)$ 9. $3\sin^2 x \cdot \cos^2 x \cdot \cos 2x = \frac{3}{4} \sin^2 2x \cos 2x$
 10. $6\sin^2(4x - 1) \cdot \cos^2(2x + 3) [2\cos(2x + 3) \cos(4x - 1) - \sin(4x - 1) \sin(2x + 3)]$

स्वाध्याय 5.4

1. $-\frac{x}{y}$ 2. $\frac{1 + \cos x}{\cos y}$ 3. $\tan^2 \frac{x+y}{2}$ 4. $-\frac{4x+3y}{3x+2y}$ 5. $\frac{y \sec^2 xy - \cos x}{\cos y - x \sec^2 xy}$ 6. $\frac{9x}{4y}$ 7. $\frac{5}{y}$
 8. $\frac{-25x}{16y}$ 9. $\frac{x-2}{3-y}$ 10. $\frac{\cos x}{\cos y}$ 11. $\frac{3}{\sqrt{1-x^2}}$ 12. $\frac{2}{1+x^2}$
 13. $f'(x) = \begin{cases} \frac{2}{1+x^2}, & x > 0 \\ -\frac{2}{1+x^2}, & x < 0 \end{cases}$ 14. $f'(x) = \begin{cases} \frac{2}{1+x^2}, & |x| < 1 \\ -\frac{2}{1+x^2}, & |x| > 1 \end{cases}$
 $x = 0$ आगे $f'(x)$ नु अस्तित्व नाही. $x = \pm 1$ आगे $f'(x)$ नु अस्तित्व नाही.
 15. $\frac{3}{1+x^2}$ 16. $\frac{-2}{\sqrt{1-x^2}}$

स्वाध्याय 5.5

1. $\frac{b}{a} \operatorname{cosec} \theta$ 2. $\frac{\cos \theta - 2\cos 2\theta}{2\sin 2\theta - \sin \theta}$ 3. $\cot \frac{\theta}{2}$ 4. $\tan t$ 5. $\tan \theta$ 6. $-\frac{bt^3}{2a}$

स्वाध्याय 5.6

1. $\left(x + \frac{1}{x} \right)^x \left(\frac{x^2 - 1}{x^2 + 1} + \log \left(x + \frac{1}{x} \right) \right) + \left(x + \frac{1}{x} \right)^{\frac{1}{x}} \left(\frac{x^2 - 1}{x^2(x^2 + 1)} - \frac{1}{x^2} \log \left(x + \frac{1}{x} \right) \right)$

2. $x^x \cdot (1 + \log x)(-\sin x^x + \cos x^x)$
3. $\frac{y}{3} \left[\frac{6}{2x+1} + \frac{20}{4x+3} - \frac{42}{7x-1} \right]$ 4. $(\log x)^{\cos x} \left(-\sin x \log(\log x) + \frac{\cos x}{x \log x} \right)$
5. $y \left[\frac{2}{x+1} + \frac{3}{x+2} + \frac{4}{x+3} \right]$ 6. $(\log x)^x \left(\frac{1}{\log x} + \log(\log x) \right) + 1 + \log x$
7. $x^{\sin x} (\sin x \log x + x \cos x \log x + \sin x) + (\sin x)^x (\log(\sin x) + x \cot x)$
8. $x^{\left(x+\frac{1}{x}\right)} \cdot \left(1 + \frac{1}{x^2} + \log x - \frac{1}{x^2} \log x\right)$
9. $(\sin x)^x (\log(\sin x) + x \cot x) + \left(\frac{1}{x}\right)^{\cos x} \left(-\frac{\cos x}{x} + \sin x \cdot \log x\right)$
10. $3^{\sin x} \cdot \cos x \log 3 - 4^{\cos x} \cdot \sin x \log 4$ 11. $\frac{y^2 - xy \log y}{x^2 - xy \log x}$ 12. $\frac{xy - y}{xy + x}$ 13. $-\frac{(x \log y + y) y}{(y \log x + x) x}$
14. $y \left(\frac{1}{1+x} + \frac{2x}{1+x^2} + \frac{4x^3}{1+x^4} + \frac{8x^7}{1+x^8} \right)$ અથવા $\frac{15x^{16} - 16x^{15} + 1}{(x-1)^2}$ 15. $4x^3 - 15x^2 + 48x - 39$

સ્વાધ્યાપ 5.7

1. $c = 1$ 2. $c = 2 + \frac{1}{\sqrt{3}}$ 3. $c = 0$ 4. $c = \sqrt{ab}$ 5. $c = \frac{\pi}{4}$ 6. $c = \pi$ 7. $c = \frac{\pi}{2}$
 8. $c = \frac{\pi}{4}$ 9. $c = \pm \frac{\pi}{2}$ 10. $c = \log_2 e$ 12. (1) $c = \sqrt{3}$ (2) $c = \sqrt{\frac{4}{\pi} - 1}$ 14. $\left(\frac{9}{2}, \frac{1}{4}\right)$

સ્વાધ્યાપ 5

1. $x = 3$ આગળ અસતત 2. $x = 1$ આગળ અસતત 3. $x = -1$ આગળ અસતત 4. $x = 2$ આગળ અસતત
 5. $k = 5$ 6. $k = 2$ 7. $k = 7$ 8. $k = \pm 2$ 9. $a = 1, b = -1$ 10. $a = 5, b = 0$
 11. $\frac{2x}{(x^2 + 1)\log 10}$ 12. $\frac{2}{1+x^2}$ 13. $-\tan x \cdot \cos(\log(\cos x))$ 14. $-\sqrt{\frac{1-y^2}{1-x^2}}$
 15. $(\sin x)^{\sin x} \cdot \cos x \cdot (\log \sin x + 1)$ 16. $(\sin x - \cos x)^{\sin x - \cos x} \cdot (\cos x + \sin x) (1 + \log(\sin x - \cos x))$
 17. $x^x (1 + \log x) + \left(x + \frac{1}{x}\right)^x \left(\log\left(x + \frac{1}{x}\right) + \frac{x^2 - 1}{1+x^2}\right)$ 18. $x^{x+\frac{1}{x}} \cdot \left(1 + \frac{1}{x^2} + \log x - \frac{\log x}{x^2}\right)$
 19. $-\sin x^x \cdot x^x (1 + \log x) + (\tan x)^x (\log \tan x + x \sec x \cosec x)$
 20. $\frac{dy}{dx} = \begin{cases} 0, & 0 < x < 1 \\ \frac{-2}{\sqrt{1-x^2}}, & -1 < x < 0, x = 0 \text{ આગળ વૈકલનીય નથી.} \end{cases}$ 21. 0
 22. $\frac{(\sin t)^t (\log \sin t + t \cot t)}{(\cos t)^t (-t \tan t + \log(\cos t))}$ 24. $\frac{1}{2(1+x^2)}$ 25. $\frac{1}{2\sqrt{1-x^2}}$ 26. $\frac{1}{2}$ 37. $-\left(\frac{a^2+b^2}{y^3}\right)$
 40. $\frac{1}{2}$ 41. 1 42. $\frac{-1}{2\sqrt{3}}$ 43. $\frac{2}{1+x^2}$ 44. $\frac{7}{1+49x^2} - \frac{3}{1+9x^2}$ 45. $\frac{1}{1+x^2}$
 46. $\frac{-x}{\sqrt{1-x^4}}$ 47. $-\frac{1}{2}$
 48. વિભાગ A : (1) c (2) d (3) a (4) b (5) b (6) b (7) c (8) b (9) b (10) c
 (11) c (12) c (13) c (14) b (15) c

વિભાગ B : (16) a (17) d (18) b (19) c (20) a (21) c (22) b (23) d (24) a (25) b

વિભાગ C : (26) c (27) b (28) d (29) d (30) a (31) a (32) c

વિભાગ D : (33) a (34) b (35) b (36) a (37) c (38) d (39) d (40) d

સ્વાધ્યાય 6.1

1. $x^3 + \frac{5}{2}x^2 - 4x + 7 \log |x| + 4\sqrt{x} + c$ 2. $\frac{10}{7}x^{\frac{7}{2}} + \frac{2}{5}x^{\frac{5}{2}} + 4x^{\frac{1}{2}} + c$
3. $\frac{2}{5}x^{\frac{5}{2}} + 2x^{\frac{3}{2}} + 6\sqrt{x} + \frac{2}{\sqrt{x}} + c$ 4. $\frac{2a}{7}x^{\frac{7}{2}} + \frac{2b}{5}x^{\frac{5}{2}} + \frac{2c}{3}x^{\frac{3}{2}} + c'$
5. $\frac{x^{e+1}}{e+1} + e^x + e^e x + c$ 6. $\frac{x^{a+1}}{a+1} + \frac{a^x}{\log_e a} + c$ 7. $\frac{x^2}{2} + 2x + 4\log|x| + c$
8. $\frac{2^x}{\log_e 2} + \log|x| + \sqrt{x^2 - 9} + c$ 9. $x^2 - \frac{1}{3}\tan^{-1}\frac{x}{3} + c$ 10. $\frac{2}{3}x^3 + \frac{3}{2}x^2 + c$
11. $\frac{x^3}{3} - \frac{x^2}{2} + x + c$ 12. $\frac{x^5}{5} - \frac{x^3}{3} + x + \tan^{-1}x + c$ 13. $\frac{x^3}{3} - x + 2\tan^{-1}x + c$
14. $-3\cos x + 5\sin x + 8\tan x + 4\cot x - x + c$ 15. $-2\cot x - 3\operatorname{cosec} x + c$
16. $4\tan x - 9\cot x - 25x + c$ 17. $-\frac{1}{4}(\cot x + \tan x) + c$ 18. $\operatorname{cosec} x + \cot x + x + c$
19. $-\cot x + \operatorname{cosec} x + c$ 20. $\tan x - \cot x - 3x + c$ 21. $-\operatorname{cosec} x - \cot x - x + c$
22. $\sec x - \tan x + x + c$ 23. $a^2\tan x - b^2\cot x - (a-b)^2x + c$ 24. $x + \frac{\sqrt{3}}{2}\log\left|\frac{x-\sqrt{3}}{x+\sqrt{3}}\right| + c$
25. $2x^4 - x^2 - 20$

સ્વાધ્યાય 6.2

1. $\frac{1}{5}\log|5x-3| + c$ 2. $\frac{1}{7}e^{7x+4} + \frac{(5x-3)^9}{45} + c$ 3. $\frac{7^{2x+3}}{2\log_e 7} - \frac{\cot 2x}{2} - x + c$
4. $\frac{5^{4x+3}}{4\log_e 5} + \frac{3}{2}\cos(2x+3) + c$ 5. $\frac{1}{\sqrt{5}}\log|\sqrt{5}x + \sqrt{5x^2-4}| + c$
6. $\frac{1}{3}\sin^{-1}\left(\frac{3x}{4}\right) + c$ 7. $\frac{1}{\sqrt{5}}\log|\sqrt{5}x + \sqrt{5x^2+3}| + \frac{1}{12}\log\left|\frac{2x+3}{2x-3}\right| + c$
8. $\frac{1}{\sqrt{2}}\log|\sqrt{2}x + \sqrt{2x^2+3}| + \frac{1}{\sqrt{21}}\tan^{-1}\left(\frac{\sqrt{7}x}{\sqrt{3}}\right) + c$
9. $2x^2 + 12x + 25\log|x-2| + c$ 10. $\frac{x^5}{5} - \frac{x^4}{4} + \frac{x^3}{3} - \frac{x^2}{2} + x + \log|x+1| + c$
11. $-\frac{2}{3}(5-3x)^{\frac{1}{2}} + c$ 12. $\frac{3^{5x-2}}{5\log_e 3} + \frac{1}{4(2x+1)^2} + c$ 13. $-\frac{1}{5}\cot(3+5x) - x + c$
14. $\frac{x}{2} - \frac{1}{12}\sin(6x+10) + c$ 15. $\frac{1}{3}(\operatorname{cosec} 3x - \cot 3x) + c$ 16. $2\sqrt{2}\sin\frac{x}{2} + c$
17. $\frac{2}{27}[(3x+4)^{\frac{3}{2}} + (3x+1)^{\frac{3}{2}}] + c$ 18. $-\frac{1}{6}(5-2x)^{\frac{3}{2}} + \frac{1}{6}(3-2x)^{\frac{3}{2}} + c$
19. $\log|x+1| - \frac{1}{x+1} + c$ 20. $x - 2\log|x+1| - \frac{2}{x+1} + c$
21. $\frac{x^3}{3} + 2x^2 + 6x + 7\log|x-1| + c$ 22. $\frac{2}{5}(x+3)^{\frac{5}{2}} - 2(x+3)^{\frac{3}{2}} + c$
23. $\frac{2}{3}(x+1)^{\frac{3}{2}} - 2(x+1)^{\frac{1}{2}} + c$ 24. $\frac{1}{6}(2x+1)^{\frac{3}{2}} + \frac{1}{2}(2x+1)^{\frac{1}{2}} + c$

25. $\frac{1}{3}(4x+7)^{\frac{3}{2}} - \frac{1}{2}(4x+7)^{\frac{1}{2}} + c$ 26. $\frac{3}{8}x + \frac{1}{4}\sin 2x + \frac{1}{32}\sin 4x + c$
27. $\frac{-3}{64}\cos 2x + \frac{1}{192}\cos 6x + c$ 28. $\frac{\cos^3(2x-1)}{6} - \frac{\cos(2x-1)}{2} + c$
29. $\frac{1}{12}\sin 6x + \frac{1}{4}\sin 2x + c$ 30. $\frac{2}{3}\sin 3x + 2\sin x + c$
31. $\frac{1}{48}\sin 12x + \frac{1}{16}\sin 4x + \frac{1}{32}\sin 8x + \frac{x}{4} + c$ 32. $\sqrt{2}\log |\cosec \frac{x}{2} - \cot \frac{x}{2}| + c$
33. $2\log \left| \sin \frac{x}{2} \right| + c$ 34. $\frac{1}{2} \left[\frac{\sin(m-n)x}{m-n} - \frac{\sin(m+n)x}{m+n} \right] + c$
35. $x\cos a + \sin a \log |\sin(x-a)| + c$ 36. $\frac{1}{\sin(b-a)} \log \left| \frac{\sin(x-b)}{\sin(x-a)} \right| + c$
37. $\frac{-3x}{2} - \frac{13}{4} \log |3-2x| + c$ 38. $\frac{1}{5}(3x^2-4x+5)^{\frac{5}{2}} + c$
39. $\sqrt{x^2+6x+4} + c$ 40. $\frac{1}{30}(5x^4+3)^{\frac{3}{2}} + c$ 41. $\frac{1}{2} \log x - \frac{1}{4} \sin(2 \log x) + c$
42. $\frac{2}{3}(\log x + 1)^{\frac{3}{2}} + c$ 43. $\frac{1}{2n(m+n\cos 2x)} + c$ 44. $\log |\sin x + \cos x| + c$
45. $\tan(xe^x) + c$ 46. $\frac{1}{2} \cot(2e^{-x} + 3) + c$ 47. $\frac{1}{e} \log |x^e + e^x| + c$
48. $\frac{-1}{\tan^3 x + 2\tan x + 9} + c$ 49. $\frac{1}{(b-a)(a\sin^2 x + b\cos^2 x)}$ 50. $\frac{1}{2(b^2-a^2)} \log |a^2\cos^2 x + b^2\sin^2 x| + c$
51. $\frac{1}{4}(\sin^{-1} x^2)^2 + c$ 52. $\frac{-2}{\sqrt{\tan^{-1} x}} + c$ 53. $\frac{1}{2}[\log (\sin e^x)]^2 + c$ 54. $-\frac{1}{2} \left\{ \log \left(\frac{x+1}{x} \right) \right\}^2 + c$
55. $\frac{1}{2}\tan^2 x + \log |\cos x| + c$ 56. $\frac{\sec^4 x}{4} + c$ 57. $\frac{\tan^5 x}{5} - \frac{\tan^3 x}{3} + \tan x - x + c$
58. $2(x+1)^{\frac{1}{2}} - 3(x+1)^{\frac{1}{3}} + 6(x+1)^{\frac{1}{6}} - 6 \log |(x+1)^{\frac{1}{6}} + 1| + c$
59. $\frac{3}{8}(x+2)^{\frac{8}{3}} - \frac{12}{5}(x+2)^{\frac{5}{3}} + 6(x+2)^{\frac{2}{3}} + c$ 60. $\frac{1}{ab} \tan^{-1} \left(\frac{b}{a} \tan x \right) + c$
61. $\frac{1}{\sqrt{3}} \tan^{-1} \left(\frac{\tan x}{\sqrt{3}} \right) + c$ 62. $\frac{1}{2\sqrt{3}} \log \left| \frac{1+\sqrt{3}\cot x}{1-\sqrt{3}\cot x} \right| + c$ 63. $\frac{1}{6} \tan^{-1} \left(\frac{2}{3} \tan x \right) + c$
64. $\frac{1}{\sqrt{2}} \tan^{-1}(\sqrt{2} \tan x) + c$

સ્વાધ્યાય 6.3

1. $\frac{-\sqrt{1-x^2}}{x} + c$ 2. $\frac{-\sqrt{9-x^2}}{x} - \sin^{-1} \frac{x}{3} + c$ 3. $\frac{1}{a^2} \frac{x}{\sqrt{x^2+a^2}} + c$
4. $\frac{a^6}{6} [\sin^{-1} \frac{x^3}{a^3} + \frac{x^3}{a^6} \sqrt{a^6-x^6}] + c$ 5. $2\sin^{-1} \sqrt{\frac{x}{2a}} + c$ 6. $2\sin^{-1} \sqrt{\frac{x}{2}} + \sqrt{2x-x^2} + c$
7. $\sqrt{a^2-x^2} - a\cos^{-1} \frac{x}{a} + c$ 8. $\frac{1}{3} \sin^{-1} \frac{x^3}{a^3} + c$ 9. $-\frac{1}{x} - \frac{3}{2} \tan^{-1} x - \frac{x}{2(1+x^2)} + c$
10. $\frac{1}{9} \frac{1}{\sqrt{16-9x^2}} + c$ 11. $\log |x + \sqrt{x^2-a^2}| - \frac{x}{\sqrt{x^2-a^2}} + c$
12. $-\frac{a^2}{2} \cos^{-1} \left(\frac{x^2}{a^2} \right) + \frac{1}{2} \sqrt{a^4-x^4} + c$ 13. $2\log |\sqrt{x-1} + \sqrt{x-2}| + c$

14. $-\frac{\sqrt{25-x^2}}{x} - \sin^{-1}\frac{x}{5} + c$ 15. $\log |\tan\frac{x}{2} + 1| + c$ 16. $\tan^{-1}(1 + \tan\frac{x}{2}) + c$
17. $\frac{2}{3} \tan^{-1}\left(\frac{\tan\frac{x}{2}}{3}\right) + c$ 18. $\frac{2}{\sin\alpha} \tan^{-1}\left(\tan\frac{\alpha}{2} \tan\frac{x}{2}\right) + c$ 19. $\frac{2}{\sqrt{3}} \tan^{-1}\left(\sqrt{3}\tan\frac{x}{2}\right) + c$
20. $\frac{1}{\sqrt{2}} \log \left| \frac{\tan\frac{x}{2} + 1 + \sqrt{2}}{\tan\frac{x}{2} + 1 - \sqrt{2}} \right| + c$ 21. $\frac{\sin^5 x}{5} - \frac{\sin^7 x}{7} + c$ 22. $\frac{\cos^3 x}{13} - \frac{\cos^1 x}{11} + c$
23. $\frac{\sin^8 x}{8} - \frac{\sin^{10} x}{10} + c$ 24. $-\frac{\cos^5 x}{5} + \frac{2}{7} \cos^7 x - \frac{\cos^9 x}{9} + c$
25. $-\cos x + \frac{2}{3} \cos^3 x - \frac{\cos^5 x}{5} + c$ 26. $\frac{1}{32} \left(2x - \frac{1}{2} \sin 2x - \frac{1}{2} \sin 4x + \frac{1}{6} \sin 6x \right) + c$

સ્વાધ્યાય 6.4

1. $\frac{2}{\sqrt{3}} \tan^{-1}\left(\frac{2x+3}{\sqrt{3}}\right) + c$ 2. $\frac{1}{2\sqrt{2}} \tan^{-1}\left(\frac{2x-1}{\sqrt{2}}\right) + c$ 3. $-\frac{1}{6\sqrt{2}} \log \left| \frac{3x+1-\sqrt{2}}{3x+1+\sqrt{2}} \right| + c$
4. $\frac{1}{4} \log \left| \frac{x+1}{3-x} \right| + c$ 5. $\log |x - \frac{1}{2} + \sqrt{x^2 - x + 5}| + c$
6. $\frac{1}{\sqrt{2}} \log \left| \frac{4x+3}{4} + \sqrt{x^2 + \frac{3}{2}x - 1} \right| + c$ 7. $\frac{1}{\sqrt{2}} \sin^{-1}\left(\frac{4x+3}{\sqrt{65}}\right) + c$
8. $\frac{1}{\sqrt{3}} \log \left| x + \frac{5}{6} + \sqrt{x^2 + \frac{5}{3}x + \frac{7}{3}} \right| + c$ 9. $\log \left| x - \frac{3}{2} + \sqrt{x^2 - 3x + 2} \right| + c$
10. $\sin^{-1}\left(\frac{x-4}{5}\right) + c$ 11. $2 \log |x^2 + 3x + 2| - 5 \log \left| \frac{x+1}{x+2} \right| + c$
12. $\frac{3}{4} \log |2x^2 + x + 1| + \frac{5}{2\sqrt{7}} \tan^{-1}\left(\frac{4x+1}{\sqrt{7}}\right) + c$
13. $2\sqrt{x^2 + 4x + 5} - \log |x + 2 + \sqrt{x^2 + 4x + 5}| + c$ 14. $-3\sqrt{5-2x-x^2} - 2 \sin^{-1}\left(\frac{x+1}{\sqrt{6}}\right) + c$
15. $2 \log |\sin^2 x - 4 \sin x + 5| + 7 \tan^{-1}(\sin x - 2) + c$ 16. $\sin^{-1}\left(\frac{e^x + 2}{3}\right) + c$
17. $\frac{1}{3} \log |x^3 + 1 + \sqrt{x^6 + 2x^3 + 3}| + c$ 18. $\sin^{-1}\left(\frac{2x^2 + 1}{\sqrt{5}}\right) + c$ 19. $\frac{1}{\sqrt{2}} \tan^{-1}\left(\frac{x^2 - 1}{\sqrt{2}x}\right) + c$
20. $\frac{1}{2\sqrt{2}} \tan^{-1}\left(\frac{x^2 - 4}{2\sqrt{2}x}\right) + c$ 21. $\frac{1}{3} \tan^{-1}\left(\frac{x^2 - 1}{3x}\right) + c$
22. $\frac{1}{2\sqrt{2}} \tan^{-1}\left(\frac{x^2 - 1}{\sqrt{2}x}\right) - \frac{1}{4\sqrt{2}} \log \left| \frac{x^2 - \sqrt{2}x + 1}{x^2 + \sqrt{2}x + 1} \right| + c$
23. $\frac{1}{2} \log \left| \frac{x^2 - x + 1}{x^2 + x + 1} \right| + c$ 24. $\frac{1}{2\sqrt{3}} \tan^{-1}\left(\frac{x^2 - 1}{\sqrt{3}x}\right) + \frac{1}{4} \log \left| \frac{x^2 - x + 1}{x^2 + x + 1} \right| + c$

સ્વાધ્યાય 6

1. $x - \frac{6}{5}x^{\frac{5}{6}} + \frac{3}{2}x^{\frac{2}{3}} - 2 \cdot x^{\frac{1}{2}} + 3 \cdot x^{\frac{1}{3}} - 6 \cdot x^{\frac{1}{6}} - 6 \log |1 + x^{\frac{1}{6}}| + c$
2. $\frac{1}{2} [\log |x + \sqrt{1+x^2}|]^2 + c$ 3. $-\frac{\sqrt{x^2 + 2x + 2}}{x+1} + c$

4. $-2\sqrt{1-x} + \cos^{-1}\sqrt{x} + \sqrt{x-x^2} + c$ 5. $\sqrt{x^2+5x+6} + \frac{1}{2}\log|x+\frac{5}{2}| + \sqrt{x^2+5x+6} + c$
 6. $x + \log|x^2+3x+2| - 2\log\left|\frac{x+1}{x+2}\right| + c$ 7. $x - \frac{7}{2}\log|x^2+7x+10| + \frac{29}{6}\log\left|\frac{x+2}{x+5}\right| + c$
 8. $\frac{1}{\sin(a-b)} \log\left|\frac{\cos(x-a)}{\cos(x-b)}\right| + c$ 9. $x\cos(a-b) + \sin(a-b)\log|\sin(x+b)| + c$
 10. $\frac{-1}{n+1}(1-x)^{n+1} + \frac{1}{n+2}(1-x)^{n+2} + c$
 11. $\frac{1}{\sqrt{2}}\tan^{-1}\left(\frac{\tan x - 1}{\sqrt{2}\tan x}\right) + \frac{1}{2\sqrt{2}}\log\left|\frac{\tan x - \sqrt{2\tan x} + 1}{\tan x + \sqrt{2\tan x} + 1}\right| + c$
 12. $\frac{1}{\sqrt{2}}\tan^{-1}\left(\frac{\tan^2 x - 1}{\sqrt{2}\tan x}\right) + c$ 13. $\frac{2}{1-a^2}\tan^{-1}\left[\left(\frac{1+a}{1-a}\right)\tan\frac{x}{2}\right] + c$
 14. विभाग A : (1) c (2) b (3) c (4) c (5) c (6) c (7) a (8) c (9) b (10) c
 (11) b (12) c (13) b (14) c (15) a (16) b (17) a (18) c (19) b (20) a
 विभाग B : (21) d (22) d (23) d (24) c (25) c (26) d (27) c (28) b (29) d
 (30) b (31) c (32) c (33) d
 विभाग C : (34) a (35) c (36) d (37) a (38) c (39) d (40) d (41) a (42) c
 (43) c
 विभाग D : (44) b (45) b (46) d (47) c (48) d

स्वाध्याय 7.1

1. $\frac{3}{7}$ 2. $\frac{4}{7}$ 3. $\frac{1}{5}, \frac{2}{3}$ 4. $\frac{1}{3}$ 5. $\frac{2}{3}$ 6. (1) $\frac{11}{56}$ (2) $\frac{13}{44}$ 7. $\frac{1}{2}$ 8. (1) $\frac{3}{8}$ (2) $\frac{2}{5}$ 9. $\frac{1}{6}$
 10. (1) $\frac{1}{2}$ (2) $\frac{3}{7}$ (3) $\frac{6}{7}$

स्वाध्याय 7.2

1. इए 2. $\frac{10}{13}$ 3. (1) $\frac{15}{91}$ (2) $\frac{15}{91}$ (3) $\frac{5}{21}$ 4. 0.21 5. $\frac{1}{3}$ 6. 0.963
 7. (1) $\frac{4}{25}$ (2) $\frac{3}{8}$ 8. (1) $\frac{71}{80}$ (2) $\frac{36}{71}$

स्वाध्याय 7.3

1. (1) $\frac{1}{10}$ (2) $\frac{1}{385}$ (3) $\frac{1}{40}$ (4) $\frac{64}{21}$ (5) $\frac{1}{16}$
 2. (1) इए 3. (1) $\frac{3}{20}$ (2) $\frac{3}{4}$ (3) $\frac{3}{10}$ (4) $\frac{11}{20}$

4.	X = x	2	3	4	5	6	7	8	9	10	11	12
	p(x)	$\frac{1}{36}$	$\frac{2}{36}$	$\frac{3}{36}$	$\frac{4}{36}$	$\frac{5}{36}$	$\frac{6}{36}$	$\frac{5}{36}$	$\frac{4}{36}$	$\frac{3}{36}$	$\frac{2}{36}$	$\frac{1}{36}$

5.	X = x	0	1	2
	p(x)	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{4}$

7. (1) $c = \frac{1}{3}$ (2) $\frac{1}{3}$ (3) $\frac{2}{3}$

6.	X = x	0	1	2
	p(x)	$\frac{42}{90}$	$\frac{42}{90}$	$\frac{6}{90}$

X = x	0	1	2	3
p(x)	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{1}{8}$

સ્વાધ્યાય 7.4

X = x	1	2	3	4	5	6
p(x)	$\frac{11}{36}$	$\frac{9}{36}$	$\frac{7}{36}$	$\frac{5}{36}$	$\frac{3}{36}$	$\frac{1}{36}$

મધ્યક = 2.53, વિચરણા = 1.96, પ્રમાણિત વિચલન = 1.4

2. ₹ 25, હા 3. (1) $k = \frac{1}{10}$ (2) મધ્યક = 3.6, વિચરણા = 1.64

4. (1) $k = \frac{1}{5}$ (2) મધ્યક = 1.1, વિચરણા = 1.69, પ્રમાણિત વિચલન = 1.3

5. $\frac{35}{12}$ 6. (1) 0 (2) 1.6 (3) 2 (4) 14.4 7. ₹ 8 8. 125, 135, 0, 1

સ્વાધ્યાય 7.5

1. (1) $\frac{63 \times 4^6}{5^{10}}$ (2) $\frac{4^9 \times 14}{5^{10}}$ 2. (1) $\frac{144}{625}$ (2) $\frac{32}{3125}$

3. 0.6517 4. 0.0512 5. $n = 16, p = \frac{1}{2}, \frac{1}{2^{16}}, \frac{696}{2^{16}}$ 6. 0.9963 7. (1) 0.3950 (2) 0.4074

8. (1) 0.6630 (2) 0.6826 9. (1) 0.512 (2) 0.384 (3) 0.104 10. (1) 40 (2) 36

સ્વાધ્યાય 7

1. $\frac{4}{7}$ 2. (1) $\frac{1}{3}$ (2) $\frac{1}{2}$ 3. $\frac{3}{7}$ 4. (1) $\frac{16}{121}$ (2) $\frac{49}{121}$ (3) $\frac{56}{121}$

5. (1) $\frac{2}{5}$ (2) $\frac{1}{10}$ (3) $\frac{13}{30}$ (4) $\frac{1}{60}$ 6. 0.175, $\frac{17}{33}$

X = x	-2	5	10
p(x)	$\frac{1}{3}$	$\frac{1}{2}$	$\frac{1}{6}$

8. $\frac{101}{2}, \frac{6767}{2}, \frac{3333}{4}$ 9. (1) $\frac{63}{256}$ (2) $\frac{65}{256}$ 10. $\frac{9}{17}$ 11. $\frac{3}{16}$ 12. 3 : 2 13. 0.35294

15. (1) a (2) c (3) a (4) b (5) a (6) d (7) a (8) d (9) b (10) d
 (11) c (12) d (13) d (14) c (15) d (16) c (17) a (18) b (19) a (20) b
 (21) c (22) b (23) a (24) c

સ્વાધ્યાય 8.1

4. 800 5. 120 6. 2300 7. 60, 180 8. શક્ય ઉકેલનો પ્રદેશ ના મળે

9. 16 10. 18 11. મહત્તમ કિમીત ના મળે 12. 400

સ્વાધ્યાય 8

1. 10 2. -2 3. 13 4. 22 5. 240 6. શક્ય ઉકેલનો પ્રદેશ ના મળે
7. A પ્રકારના મશીન 6, B પ્રકારના મશીન 0, મહતમ નિર્ગમ 360
8. A પ્રકારનો આહાર 5 એકમ, B પ્રકારનો આહાર 30 એકમ, ન્યૂનતમ ખર્ચ ₹ 145.
9. 5 લિટર તેલના ટબા 8, 1 કિગ્રા ધીના ટબા 12, મહતમ નફો ₹ 392.
10. 30 11. Aથી D : 500 લિટર, Aથી E = 3000 લિટર, Aથી F : 3500 લિટર, Bથી D : 4000 લિટર
12. 40 ઉચ્ચવર્ગની ટિકિટ, 160 સામાન્ય વર્ગની ટિકિટ, મહતમ નફો ₹ 1,36,000
13. 6, 6
14. (1) b (2) b (3) c (4) d (5) c (6) b (7) a (8) d (9) a (10) b
(11) c (12) a (13) b (14) b

Srinivasa Ramanujan : Life in England

Ramanujan boarded the S.S. Nevasa on 17 March 1914, and at 10 o'clock in the morning, the ship departed from Madras. He arrived in London on 14 April, with E. H. Neville waiting for him with a car. Four days later, Neville took him to his house on Chesterton Road in Cambridge. Ramanujan immediately began his work with Littlewood and Hardy. After six weeks, Ramanujan moved out of Neville's house and took up residence on Whewell's Court, just a five-minute walk from Hardy's room. Hardy and Ramanujan began to take a look at Ramanujan's notebooks. Hardy had already received 120 theorems from Ramanujan in the first two letters, but there were many more results and theorems to be found in the notebooks. Hardy saw that some were wrong, others had already been discovered, while the rest were new breakthroughs. Ramanujan left a deep impression on Hardy and Littlewood. Littlewood commented, "I can believe that he's at least a Jacobi", while Hardy said "he can compare him only with [Leonhard] Euler or Jacobi."

Ramanujan spent nearly five years in Cambridge collaborating with Hardy and Littlewood and published a part of his findings there. Hardy and Ramanujan had highly contrasting personalities. Their collaboration was a clash of different cultures, beliefs and working styles. Hardy was an atheist and an apostle of proof and mathematical rigour, whereas Ramanujan was a deeply religious man and relied very strongly on his intuition. While in England, Hardy tried his best to fill the gaps in Ramanujan's education without interrupting his spell of inspiration.

Ramanujan was awarded a B.A. degree by research (this degree was later renamed PhD) in March 1916 for his work on highly composite numbers, which was published as a paper in the Journal of the London Mathematical Society. The paper was over 50 pages with different properties of such numbers proven. Hardy remarked that this was one of the most unusual papers seen in mathematical research at that time and that Ramanujan showed extraordinary ingenuity in handling it. On 6 December 1917, he was elected to the London Mathematical Society. He became a Fellow of the Royal Society in 1918, becoming the second Indian to do so, following Ardaseer Cursetjee in 1841, and he was one of the youngest Fellows in the history of the Royal Society. He was elected "for his investigation in Elliptic functions and the Theory of Numbers." On 13 October 1918, he became the first Indian to be elected a Fellow of Trinity College, Cambridge.

પારિભાષિક શબ્દો

પ્રતિવિકલન	Antiderivation	સુરેખ આયોજન	Linear Programming
પ્રતિવિકલિત	Antiderivative	અનેક-એક વિધેય	Many-one Function
સ્વૈર અચળ	Arbitrary Constant	ગાણિતિક અપેક્ષા	Mathematical Expectation
દિક્કિયા	Binary Operation	શ્રેણિક	Matrix
દિપદી વિતરણ	Binomial Distribution	આદેશની રીત	Method of Substitution
સાંકળનો નિયમ	Chain Rule	ઉપનિશાયક	Minor
સહઅવયવ	Cofactor	સામાન્ય શ્રેણિક	Non-singular Matrix
સ્તંભ	Column	હેતુલક્ષી વિધેય	Objective Function
સંઘોજિત વિધેય	Composite Function	એક-એક વિધેય	One-one Function
શરતી સંભાવના	Conditional Probability	વ્યાપ્ત વિધેય	Onto Function
સુસંગત	Consistent	ઈઝ્ટમ શક્ય ઉકેલ	Optimal Feasible Solution
મર્યાદાઓ	Constraints	ઈઝ્ટમ મૂલ્ય	Optimum Value
નિર્ણાયક ચલરાશિઓ	Decision Variables	કક્ષા	Order
નિશાયક	Determinant	પૂર્વગ	Primitive
સામ્ય સંબંધ	Equivalence Relation	યાદચિક ચલ	Random Variable
ઘટના	Event	સ્વવાચક સંબંધ	Reflexive Relation
શક્ય ઉકેલનો પ્રદેશ	Feasible Region	હાર	Row
શક્ય ઉકેલ	Feasible Solution	નિદર્શાવકાશ	Sample Space
ગૂઠ વિધેય	Implicit Function	વિસંમિત શ્રેણિક	Skew-symmetric Matrix
અનિયત સંકલિત	Indefinite Integral	પ્રમાણિત વિચલન	Standard Deviation
નિરપેક્ષ ઘટનાઓ	Independent Events	સંમિત શ્રેણિક	Symmetric Matrix
અશક્ય ઉકેલ	Infeasible Solution	સંમિત સંબંધ	Symmetric Relation
પ્રતિવિકલનીય	Integrable	પરંપરિત સંબંધ	Transitive Relation
સંકલિત	Integral	પરિવર્ત શ્રેણિક	Transpose of a Matrix
સંકલ્ય	Integrand	સાર્વત્રિક સંબંધ	Universal Relation
પ્રતિવિધેય	Inverse Function	વિચરણ	Variance

