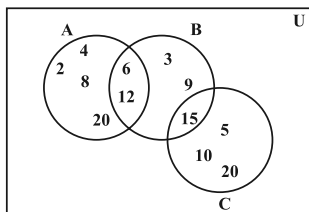


# ANSWERS

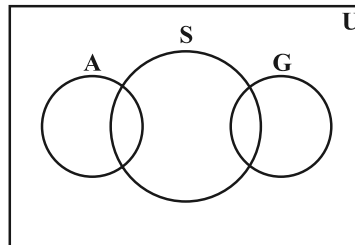
## 1.3 EXERCISE

1. (i)  $\{2\}$  (ii)  $\{0, 1\}$  (iii)  $\{1, p\}$
2. (i)  $\{0, -1, 1\}$  (ii)  $\left\{\frac{-11}{3}\right\}$  (iii)  $\{-\sqrt{3}, -\sqrt{2}, \sqrt{2}, \sqrt{3}\}$
3.  $\{1, 2, 2^2, 2^3, \dots, 2^{p-1}, (2^p - 1)\}$
4. (i) True (ii) False (iii) True (iv) True
7. (i)  $\{2, 4, 6, 8, \dots, 98\}$  (ii)  $\{1, 4, 9, 16, 25, 36, 49, 64, 81, \dots\}$
8. (i)  $\{4, 8, 12\}$  (ii)  $\{7, 8, 9\}$  (iii)  $\left\{\frac{1}{2}, 1, \frac{3}{2}\right\}$  (iv)  $\{0, 1, 2\}$
9. (i)  $\{4, 5, 6, \dots, 10\}$  (ii)  $\{5\}$  (iii)  $\{1, 2, 3, 4, 5\}$

10.



11.



13. True 14. False 15. True
16. True 17. True 22.  $T = \{10\}$
24. (i) 2 (ii) 3 (iii) 3 (iv) 9
25. 25 26. 20 27. (a) 3300 (b) 4000
28. (i) 6, (ii) 3, (iii) 9, (iv) 1, (v) 2, (vi) 6, (vii) 30, (viii) 20 29. C
30. B 31. B 32. D 33. C
34. D 35. B 36. B 37. C

38. C                      39. C                      40. A                      41. B  
 42. B                      43. C                      44. [1,2]                  45. 1  
 46.  $n(B)$                 47.  $A \cap B'$             48.  $\{\phi, \{1\}, \{2\}, \{1, 2\}$   
 49.  $\{0, 1, 2, 3, 4, 5, 6, 8\}$  50.(i)  $\{1, 5, 9, 10\}$  (ii)  $\{1, 2, 3, 5, 6, 7, 9, 10\}$   
 51.  $A \cup B'$               52. (i)  $\leftrightarrow$ (b) (ii)  $\leftrightarrow$ (c) (iii)  $\leftrightarrow$  (a) (iv)  $\leftrightarrow$ (f) (v)  $\leftrightarrow$ (d) (vi)  $\leftrightarrow$  (e)  
 53. True                  54. False                  55. False                  56. True  
 57. True                  58. False

### 2.3 EXERCISE

- $\{(-1, 1), (-1, 3), (2, 1), (2, 3), (3, 1), (3, 3)\}$
  - $\{(1, -1), (1, 2), (1, 3), (3, -1), (3, 2), (3, 3)\}$
  - $\{(1, 1), (1, 3), (3, 1), (3, 3)\}$
  - $\{(-1, -1), (-1, 2), (-1, 3), (2, -1), (2, 2), (2, 3), (3, -1), (3, 2), (3, 3)\}$
- $\{(0, 1), (0, 2), (1, 1), (1, 2), (2, 1), (2, 2)\}$
- $\{(0, 3), (1, 3)\}$
  - $\{(0, 2), (0, 3), (0, 4), (0, 5), (1, 2), (1, 3), (1, 4), (1, 5)\}$
- $a = \frac{11}{3}$  and  $b = \frac{2}{3}$     (ii)  $a = 0$  and  $b = -2$
- $\{(1, 4), (2, 3), (3, 2), (4, 1)\}$
  - $\{(1, 1), (1, 2), (1, 3), (2, 1), (2, 2), (3, 1)\}$
  - $\{(4, 5), (5, 4), (5, 5)\}$
- Domain of  $R = \{0, 3, 4, 5\} =$  Range of  $R$
- Domain of  $R_1 = [-5, 5]$  and Range of  $R_1 = [-3, 17]$
- $R_2 = \{(0, 8), (8, 0), (0, -8), (-8, 0)\}$
- Domain of  $R_3 = \mathbf{R}$  and range of  $R_3 = \mathbf{R}^+ \cup \{0\}$
- $h$  is not a function
  - $f$  is a function
  - $g$  is a function
  - $s$  is a function
  - $t$  is a constant function
- 6
  - $\frac{1364}{4}$
  - 13
  - $t^2 - 4$
  - $t + 5$
- $x = 4$
  - $x > 4$
- $(f + g)x = x^2 + 2x + 2$
  - $(f - g)x = 2x - x^2$

- (iii)  $(fg)x = 2x^3 + x^3 + 2x + 1$       (iv)  $\left(\frac{f}{g}\right)x = \frac{2x+1}{x^2+1}$
14. (i)  $f = \{(-1, 0), (0, 1), (3, 28), (7, 344), (9, 730)\}$
15.  $x = -1, \frac{4}{3}$
16. Yes,  $\alpha = 2, \beta = -1$
17. (i)  $\mathbb{R} - \{2m\pi : m \in \mathbb{Z}\}$       (ii)  $\mathbb{R}^+$       (iii)  $\mathbb{R}$   
       (iv)  $\mathbb{R} - \{-1, 1\}$       (v)  $\mathbb{R} - \{4\}$
18. (i)  $[\frac{3}{2}, \infty)$       (ii)  $(-\infty, 1]$       (iii)  $[0, \infty)$       (iv)  $[-2, 4]$
19.  $f(x) = \begin{cases} -2x, & -3 \leq x < -2 \\ 4, & -2 \leq x < 2 \\ 2, & 2 \leq x \leq 3 \end{cases}$
21. (i)  $(f+g)x = \sqrt{x} + x$       (ii)  $(f-g)x = \sqrt{x} - x$   
       (iii)  $(fg)x = x^{\frac{3}{2}}$       (iv)  $\left(\frac{f}{g}\right)x = \frac{1}{\sqrt{x}}$
22. Domain of  $f = (5, \infty)$  and Range of  $f = \mathbb{R}^+$
24. D      25. D      26. B      27. C  
 28. B      29. B      30. A      31. C  
 32. C      33. A      34. B      35. A  
 36.  $\{2, 3, 4, 5\}$       37. (a)  $\leftrightarrow$  (iii) (b)  $\leftrightarrow$  (iv) (c)  $\leftrightarrow$  (ii) (d)  $\leftrightarrow$  (i)  
 38. False      39. False      40. True      41. False  
 42. True.

### 3.3 EXERCISE

4.  $\frac{56}{33}$

5.  $\frac{2 \cos x}{\sqrt{\cos 2x}}$

8.  $\frac{1}{\sqrt{2}+1}$

15.  $\theta = n\pi + (-1)^n \frac{\pi}{4} - \frac{\pi}{4}$

16.  $\theta = 2n\pi + \frac{7\pi}{4}$

17.  $\theta = 2n\pi \pm \frac{\pi}{3}$

18.  $\theta = \frac{\pi}{3}, \frac{5\pi}{3}$

19.  $x = \frac{\pi}{6}, \frac{\pi}{4}, \frac{\pi}{2}$

22. 1

25.  $\frac{23}{17} \left( \frac{\sqrt{3}-1}{2} + \frac{1}{\sqrt{2}} \right)$

26.  $\frac{3}{2}$

27.  $n\pi \pm \frac{\pi}{4}$

28.  $\frac{n\pi}{2} \pm \frac{\pi}{8}$

29.  $\theta = 2n\pi \pm \frac{\pi}{4} + \frac{\pi}{12}$

30. C

31. D

32. D

33. C

34. B

35. C

36. B

37. C

38. A

39. B

40. D

41. D

42. A

43. D

44. C

45. B

46. C

47. C

48. C

49. B

50. C

51. B

52. C

53. C

54. A

55. B

56. A

57. B

58. B

59. D

60. 1

61.  $\frac{1}{8}$

62.  $\tan \beta$

63.  $\frac{1}{4} [4 - 3(a^2 - 1)^2], \sqrt{2 - a^2}$

64.  $x^2 - \frac{2}{\sin 2A} x + 1$

65. 13

66.  $[-3, 3]$

67. 2

68. True

69. False

70. False

71. True

72. False

73. True

74. True

75. True

76. (a)  $\leftrightarrow$  (iv) (b)  $\leftrightarrow$  (i) (c)  $\leftrightarrow$  (ii) (d)  $\leftrightarrow$  (iii)

### 4.3 EXERCISE

2.  $P(n) : 1 + 2 + 3 + \dots + n = \frac{n(n+1)}{2}$

28. A

**30. False**

### 5.3 EXERCISE

4.  $\frac{2}{5}$

12.  $\frac{1}{2} - 2i$

18. 0

22.  $-2 - i$

23.  $\sqrt{2}\left(\cos\frac{5\pi}{12} + i\sin\frac{5\pi}{12}\right)$

(ii)  $-15$

(vi)  $\bar{z}_1$  (vii) 0

(X)  $-2\sqrt{3} + 2i$

(iv) T

(viii) F

(c)  $\Leftrightarrow$  (i),

(f)  $\Leftrightarrow$  (vi),

(h)  $\leftrightarrow$  (vii)

28.  $\frac{-2}{25} - i\frac{11}{25}$       29. No      30.  $\frac{(a^2+1)^4}{4a^2+1}$       31.  $-2\sqrt{3} + 2i$
32. 1      33.  $\frac{2\pi}{3}$       34. Real axis
35. D      36. C      37. B      38. A
39. B      40. A      41. A      42. B
43. D      44. D      45. B      46. B
47. C      48. C      49. C      50. A

### 6.3 EXERCISE

1.  $\frac{1}{3} \leq x \leq 1$       2.  $[0,1] \cup [3,4]$       3.  $(-\infty, -5) \cup (-3, 3) \cup [5, \infty)$
4.  $[-4, -2] \cup [2, 6]$       5.  $\left[\frac{-34}{3}, \frac{22}{3}\right]$       6. No Solution
7. More than 2000.
8. Between 7.77 and 8.77.
9. More than 230 litres but less than 920 litres.
10. Between 104 °F and 113 °F
11. 41 cm.
12. Between 8 km and 10 km
13. No Solution
14.  $x + y \leq 20, 3x + 2y \leq 48, x \geq 0, y \geq 0$
15.  $x + y \leq 8, x + y \geq 4, x \leq 5, y \leq 5, x \geq 0, y \geq 0$
17. No Solution.
19. C      20. C      21. A      22. B
23. D      24. C      25. B      26. A
27. D      28. B      29. A      30. B
31. (i) F      (ii) F      (iii) T      (iv) F  
(v) T      (vi) F      (vii) T      (viii) F

- |                |             |              |               |
|----------------|-------------|--------------|---------------|
| (ix) T         | (x) F       | (xi) T       | (xii) F       |
| (xiii) F       | (xiv) T     | (xv) T       |               |
| 32. (i) $\leq$ | (ii) $\geq$ | (iii) $>$    | (iv) $>$      |
| (v) $>$        | (vi) $>$    | (vii) $<, >$ | (viii) $\leq$ |

## 7.3 EXERCISE

- |                                 |  |                             |                            |
|---------------------------------|--|-----------------------------|----------------------------|
| 1. 1440                         | 2. 481   | 3. 780                      | 4. 144                     |
| 5. 22                           | 6. 3960  | 7. 4,68000                  | 8. 200                     |
| 9. ${}^{n-3}C_{r-3}(r-2)!3!$    | 10. 14400  | 11. 112                     | 15. $r = 3$                |
| 16. 192                         | 17. 190  | 18. 8400                    | 19. 3      20. 11          |
| 21. $\frac{18!}{(6!)^3}$        | 22. (a) $11C_4$ (b) $6C_2 \times 5C_2$ (c) $6C_4 + 5C_4$ |                             |                            |
| 23. (i) $14C_9$ (ii) $14C_{11}$ | 24. $2(20C_5 \times 20C_6)$                              |                             |                            |
| 25. (i) 21, (ii) 441 (iii) 91   | 26. A  | 27. B                       |                            |
| 28. C                           | 29. B  | 30. C                       | 31. A                      |
| 32. B                           | 33. D  | 34. B                       | 35. C                      |
| 36. D                           | 37. A  | 38. C                       | 39. B                      |
| 40. B                           | 41. $n = 7$  | 42. 0                       | 43. $n^r$                  |
| 44. 1,51,200                    | 45. 80   | 46. $5^6$                   | 47. 18                     |
| 48. 35                          | 49. 7800   | 50. 64                      | 51. False                  |
| 52. False                       | 53. False  | 54. True                    | 55. True                   |
| 56. True                        | 57. True   | 58. False                   | 59. False                  |
| 60. (a) $\leftrightarrow$ (ii)  | (b) $\leftrightarrow$ (iii) and                          | (c) $\leftrightarrow$ (i)   |                            |
| 61. (a) $\leftrightarrow$ (iii) | (b) $\leftrightarrow$ (i)                                | (c) $\leftrightarrow$ (iv), | (d) $\leftrightarrow$ (ii) |
| 62. (a) $\leftrightarrow$ (iv)  | (b) $\leftrightarrow$ (iii)                              | (c) $\leftrightarrow$ (ii), | (d) $\leftrightarrow$ (i)  |
| 63. (a) $\leftrightarrow$ (i)   | (b) $\leftrightarrow$ (iii)                              | (c) $\leftrightarrow$ (iv), | (d) $\leftrightarrow$ (ii) |
| 64. (a) $\leftrightarrow$ (iii) | (b) $\leftrightarrow$ (i)                                | (c) $\leftrightarrow$ (ii)  |                            |

## 8.3 EXERCISE

- |   |                |        |                         |
|---|----------------|--------|-------------------------|
| 1. ${}^{15}C_{10} \left(\frac{1}{6}\right)^5$ | 2. $k = \pm 3$ | 3. -19 | 4. $-3003(3^{10})(2^5)$ |
|---|----------------|--------|-------------------------|

5. (i)  $-252$  (ii)  $\frac{189}{8}x^{17}; \frac{-21}{16}x^{19}$       6.  $-252$  7.  $-1365$  8.  $252y^{\frac{5}{2}}x^{\frac{5}{3}}$
9.  $r = 6$       11. 990      12.  $p = \pm 2$       14.  $n = 9$
17.  $\frac{17}{54}$       18. (C)      19. (A)      20. (C)
21. (D)      22. (B)      23. (B)      24. (C)
25.  ${}^{30}C_{15}$       26.  $\frac{(n+1)(n+2)}{2}$       27.  ${}^{16}C_8$       28.  $n = 12$
29.  $\frac{1120}{27}a^{-6}a^4$       30.  ${}^{28}C_{14}a^{56}b^{14}$       31. 1      32. Third term
33. 12      34. F      35. T      36. F
37. F      38. T      39. F      40. F

### 9.3 EXERCISE

2. Rs 1400      3. Rs 8080, Rs 83520      5. 12 days
6.  $3420^\circ$       7.  $\frac{15}{8}cm$       8. 2480 m      9. Rs 725
11. (i)  $4n^3 + 9n^2 + 6n$  (ii) 4960      12.  $T_r = 6r - 1$       17. D
18. C      19. A      20. B      21. C
22. B      23. B      24. A      25. D
26. A      27.  $\frac{a}{b}$  or  $\frac{b}{c}$       28. First term + last term
29.  $4^5$       30. F      31. T      32. T
33. F      34. F
35. (a)  $\leftrightarrow$  (iii) (b)  $\leftrightarrow$  (i) (c)  $\leftrightarrow$  (ii)
36. (a)  $\leftrightarrow$  (iii) (b)  $\leftrightarrow$  (i) (c)  $\leftrightarrow$  (ii) (d)  $\leftrightarrow$  (iv)

### 10.3 EXERCISE

1.  $x + y + 1 = 0$       2.  $x - 4y + 3 = 0$       3.  $60^\circ$  or  $120^\circ$



4.  $x + y = 7$  or  $\frac{x}{6} + \frac{y}{8} = 1$       5.  $(3, 1), (-7, 11)$
7.  $y - \sqrt{3}x - 2 + \sqrt{3} = 0$       8.  $3x + 4y + 3 = 0$
9.  $a = \frac{-8}{3}, b = 4$       10.  $8x - 5y + 60 = 0$
11.  $\sqrt{3}x + y = 8$       12.  $x - 7y - 12 = 0$
13.  $\sqrt{\frac{2}{3}}$       14.  $(1, 1)$
15.  $15^\circ$  or  $75^\circ$       17.  $9x - 20y + 96 = 0$
18.  $3x - 4y + 6 = 0$  and  $4x - 3y + 1 = 0$       20.  $(0, 2 + \frac{5\sqrt{3}}{2})$
22. A      23. A      24. B      25. B
26. C      27. D      28. A      29. A
30. A      31. B      32. B      33. A
34. C      35. A      36. B      37. B
38. C      39. D      40. B      41. B
42.  $(1, -2)$       43.  $x + y + 1 = 0$       44.  $3x - y - 7 = 0, x + 3y - 9 = 0$
45. opposite sides      46.  $13(x^2 + y^2) - 83x + 64y + 182 = 0$
47.  $4x^2y^2 = p^2(x^2 + y^2)$       48. True      49. False
50. False      51. True      52. True      53. True
54. True      55. False      56. False
57. (a)  $\leftrightarrow$  (iii)      (b)  $\leftrightarrow$  (i) and      (c)  $\leftrightarrow$  (ii)
58. (a)  $\leftrightarrow$  (iv)      (b)  $\leftrightarrow$  (iii)      (c)  $\leftrightarrow$  (i),      (d)  $\leftrightarrow$  (ii)
59. (a)  $\leftrightarrow$  (iii)      (b)  $\leftrightarrow$  (i)      (c)  $\leftrightarrow$  (iv),      (d)  $\leftrightarrow$  (ii)

### 11.3 EXERCISE

1.  $x^2 + y^2 - 2ax - 2ay + a^2 = 0$       3.  $(\frac{a}{2}, \frac{b}{2})$

4.  $x^2 + y^2 - 2x - 4y + 1 = 0$       5.  $\frac{3}{4}$
6.  $x^2 + y^2 + 4x + 4y + 4 = 0$       7.  $(1, 2)$
8.  $x^2 + y^2 - 2x + 4y - 20 = 0$       9.  $k \pm 8$
10.  $x^2 + y^2 - 6x + 12y - 15 = 0$       11.  $\frac{\sqrt{3}}{2}$
12. eccentricity =  $\frac{4}{5}$  and foci  $(4, 0)$  and  $(-4, 0)$       13.  $\frac{39}{4}$
14.  $\frac{4x^2}{81} + \frac{4y^2}{45} = 1$       15. 18      16.  $(2, 4), (2, -4)$
17.  $\frac{4a \cos \theta}{\sin^2 \theta}$       18.  $x^2 + 8y = 32$       19.  $m = 1$       20.  $x^2 - y^2 = 32$
21.  $\frac{\sqrt{13}}{2}$       22.  $\frac{x^2}{4} - \frac{y^2}{5} = \frac{4}{9}$       23.  $x^2 + y^2 - 2x + 2y = 47$
24.  $x^2 + y^2 - 4x - 10y + 25 = 0$       25.  $(x - 3)^2 + (y + 1)^2 = 38$
26.  $x^2 + y^2 - 18x - 16y + 120 = 0$       27.  $x^2 + y^2 - 8x - 6y + 16 = 0$
28. (a)  $y^2 = 12x - 36$ , (b)  $x^2 = 32 - 8y$ , (c)  $4x^2 + 4xy + y^2 + 4x + 32y + 16 = 0$
29.  $3x^2 + 4y^2 - 36x = 0$       30.  $9x^2 + 5y^2 = 180$
32. (a)  $15x^2 - y^2 = 15$  (b)  $9x^2 - 7y^2 + 343 = 0$ , (c)  $y^2 - x^2 = 5$
33. False      34. False      35. True      36. False
37. True      38. False      39. True      40. True
41.  $(x - 3)^2 + (y + 4)^2 = \left(\frac{45}{13}\right)^2$       42.  $x^2 + y^2 - 46x + 22y = 0$
43.  $6 + 2\sqrt{5}, 2\sqrt{5}$       44.  $\frac{4x^2}{1} + \frac{4y^2}{5} = 1$
45.  $4x^2 + 4xy + y^2 + 4x + 32y + 16 = 0$       46.  $\frac{y^2}{36} - \frac{x^2}{64} = 1$  and  $(0, \pm 10)$ .
47. (C)      48. (C)      49. (C)      50. (C)

51. A                      52. B                      53. A                      54. A  
 55. D                      56. B                      57. C                      58. A  
 59. A

### 12.3 EXERCISE

2. (i) 1<sup>st</sup> octant (ii) 4<sup>th</sup> octant (iii) viii<sup>th</sup> octant (iv) v<sup>th</sup> octant (v) 2<sup>nd</sup> octant  
 (vi) 3<sup>rd</sup> octant (vii) viii<sup>th</sup> octant (viii) vi<sup>th</sup> octant  
 3. (i) (3,0,0), (0,4,0), (0,0,2) (ii) (-5, 0, 0), (0,3,0), (0,0,7) (iii) (4,0,0), (0, -3, 0), (0,0,5)  
 4. (i) (3,4,0), (0,4,5), (3,0,5) (ii) (-5, 3, 0), (0,3,7), (-5, 0, 7) (iii) (4, -3, 0), (0, -3, -5), (4, 0, -5)  
 5. 5                      6. 11                      9. (2, -4, 16)                      11. (-2, -2, -1)  
 12. (1, 1, -2)                      13. (-3, 4, -7), (7, 2, 5) and (-3, 12, 17)                      14. (4, 7, 6)  
 15. (4, -5, 1), (3, -2, -1)                      16.  $a = -2, b = -8, c = 2$   
 17.  $\left(\frac{7}{2}, \frac{13}{2}, 9\right)$                       18. 2:1 externally  
 19. vertices are (3,4,5), (-1,6,-7), (1,2,3) and centroid is  $\left(1, 4, \frac{1}{3}\right)$   
 20. 1:3 externally  
 21. (2,0,0), (2,2,0), (0,2,0), (0,2,2) (0,0,2) (2,0,2), (0,0,0), (2,2,2)  
 22. A                      23. B                      24. A                      25. B  
 26. A                      27. B                      28. B                      29. A  
 30. A                      31. B                      32. A                      33. D  
 34. A                      35. Three coordinates planes                      36. Three pairs  
 37. given point                      38. Eight                      39. (0, y, z)                      40.  $x = 0$   
 41. (0, 0, z)                      42.  $x = 0, y = 0$                       43. z- coordinates  
 44. (y, z coordinates)                      45. yz-plane                      46. x-axis                      47.  $\sqrt{333}$   
 48.  $a = 5$  or  $-3$                       49. (1, 1, -2)  
 50. (a)  $\leftrightarrow$  (iii) (b)  $\leftrightarrow$  (i) (c)  $\leftrightarrow$  (ii) (d)  $\leftrightarrow$  (vi) (e)  $\leftrightarrow$  (iv) (f)  $\leftrightarrow$  (v) (g)  $\leftrightarrow$  (viii)  
 (h)  $\leftrightarrow$  (vii) (i)  $\leftrightarrow$  (x) (j)  $\leftrightarrow$  (ix)

## 13.3 EXERCISE

1. 6
2. 2
3.  $\frac{1}{\sqrt[2]{x}}$
4.  $\frac{1}{3}2^{\frac{-2}{3}}$
5. 3
6.  $\frac{5}{2}(a+2)^{\frac{3}{2}}$
7. 7
8. 8
9.  $\frac{8}{5}$
10. 1
11. 0
12.  $\frac{1}{15}$
13.  $\frac{7}{2}$
14.  $n = 5$
15.  $\frac{3}{7}$
16.  $\frac{1}{4}$
17. 2
18. 1
19.  $\frac{m^2}{n^2}$
20. 3
21.  $\sqrt{2}$
22. 2
23. 1
24.  $2\sqrt{a} \cos a$
25. 4
26.  $\frac{1}{4\sqrt{2}}$
27. 0
28.  $k = \frac{3}{8}$
29.  $3x^2 + 2x + 1 - \frac{1}{x^2}$
30.  $3x^2 - \frac{3}{x^2} - \frac{3}{x^4} + 3$
31.  $3x \sec^2 x + 5 \sec^2 x + 3 \tan x + 3$
32.  $2 \tan x \sec^2 x$
33.  $\frac{55 - 40x - 15x^2}{(5x^2 - 7x + 9)^2}$
34.  $\frac{-x^5 \cos x + 5 \sec^4 \sin x + 1}{\sin^2 x}$
35.  $\frac{x}{\sqrt{2}} \operatorname{cosec} x (2 - x \cot x)$
36.  $(ax^2 + \cot x)(-q \sin x) + (p + q \cos x)(2ax - \operatorname{cosec}^2 x)$
37.  $\frac{bc \cos x + ad \sin x + db}{(c + d \cos x)^2}$
38.  $2 \cos 2x$

39.  $(2x-7)(30x-43)(3x+5)^2$

40.  $x^2 \cos x + 2x \sin x - 2 \sin 2x$

41.  $\frac{3}{4} \sin^2 2x \cos 2x$

42.  $\frac{-(2ax+b)}{(ax^2+bx+c)^2}$

43.  $-2x \sin(x^2+1)$

44.  $\frac{ad-bc}{(cx+d)^2}$

45.  $\frac{2}{3} x^{-\frac{1}{3}}$

46.  $\cos x - x \sin x$

47.  $\sec x(x \tan x + 1)$

48.  $\frac{2\alpha}{\alpha^2 - \beta^2}$

49.  $-4$

50.  $\frac{1}{\sqrt{2}}$

52.  $k = 6$

53.  $c = 1$

54. C

55. A

56. A

57. B

58. A

59. C

60. C

61. D

62. B

63. D

64. C

65. D

66. B

67. B

68. D

69. A

70. A

71. A

72. A

73. B

74. C

75. A

76. D

77. 1

78.  $m = \frac{2\sqrt{3}}{3}$

79. y

80. 1

## 14.3 EXERCISE

1. (i) to (v) and (viii) to (x) are statements.

2. (i)  $p$  : Number 7 is prime  
 $q$  : Number 7 is odd(ii)  $p$  : Chennai is in India $q$  : Chennai is capital of Tamil Nadu(iii)  $p$  : 100 is divisible by 3  
 $q$  : 100 is divisible by 11(iv)  $p$  : Chandigarh is capital of Haryana $q$  : Chandigarh is the capital of U.P $r$  : 100 is divisible by 5

- (v)  $p : \sqrt{7}$  is a rational number (vi)  $p : 0$  is less than every positive integer  
 $q : \sqrt{7}$  is an irrational number  $q : 0$  is less than every negative integer
- (vii)  $p$  : plants use sunlight for photosynthesis  
 $q$  : plants use water for photosynthesis  
 $r$  : plants use carbondioxide for photosynthesis
- (viii)  $p$  : two lines in a plane intersect at one point  
 $q$  : two lines in a plane are parallel
- (ix)  $p$  : a rectangle is a quadrilateral  
 $q$  : a rectangle is a 5- sided polygons.
3. (i) Compound statement is true and its component statements are :  
 $p : 57$  is divisible by 2 and  $q : 57$  is divisible by 3  
(ii) component statement is true and its component statements are :  
 $p : 24$  is multiple of 4 and  $q : 24$  is multiple of 6  
(iii) component statement is false and is component statements are  
 $p$  : All living things have two eyes  
 $q$  : All living things have two legs  
(iv) component statement is true and its component statements are :  
 $p : 2$  is an number ;  $q : 2$  is a prime number
4. (i) The number 17 is not prime (ii)  $2 + 7 \neq 6$  (iii) Violet are not blue  
(iv)  $\sqrt{5}$  is not a rational number (v) 2 is a prime number  
(vi) There exists a real number which is not an irrational number  
(vii) Cow has not four legs (viii) A leap year has not 366 days  
(ix) There exist similar triangles which are not congruent  
(x) Area of a circle is not same as the perimeter of the circle
5. (i)  $p \wedge q$  where  $p$  : Rahul passed in Hndi;  $q$  : Rahul passed in English  
(ii)  $p \wedge q$  where  $p$  :  $x$  is even integer ;  $q$  :  $y$  is even integer  
(iii)  $p \wedge q \wedge r$  where  $p$  : 2 is factor of 12;  $q$  : 3 is factor of 12;  $r$  : 6 is factor of 12  
(iv)  $p \vee q$  where  $p$  :  $x$  is an odd integer ;  $q$  :  $x + 1$  is an odd integer  
(v)  $p \vee q$  where  $p$  :  $a$  number is divisible by 2,  $q$  : it is divisibe by 3  
(vi)  $p \vee q$  where  $p$  :  $x = 2$  is a root of  $3x^2 - x - 10 = 0$ ,  $q$  :  $x = 3$  is a root of  $3x^2 - x - 10 = 0$

- (vii)  $p \vee q$  where  $p$  : student can take Hindi as an optional paper and  $q$  : student can take English as an optional paper.
6. (i) It is false that all rational numbers are real and complex  
 (ii) It is false that all real numbers are rational or irrational  
 (iii)  $x = 2$  is not a root of the quadratic equation  $x^2 - 5x + 6 = 0$  or  $x = 3$  is not a root of the quadratic equation  $x^2 - 5x + 6 = 0$   
 (iv) A triangle has neither 3-sides nor 4-sides  
 (v) 35 is not a prime number and it is not a complex number  
 (vi) It is false that all prime integers are either even or odd  
 (vii)  $|x|$  is not equal to  $x$  and it not equal to  $-x$   
 (viii) 6 is not divisible by 2 or it is not divisible by 3.
7. (i) If the number is odd number then its square is odd number  
 (ii) If you take the dinner then you will get sweet dish  
 (iii) If you will not study then you will fail  
 (iv) If an integer is divisible by 5 then its unit digits are 0 or 5  
 (v) If the number is prime then its square is not prime  
 (vi) If  $a, b$  and  $c$  are in A.P then  $2b = a + c$ .
8. (i) The unit digit of an integer is zero if and only if it is divisible by 5.  
 (ii) A natural number  $n$  is odd if and only if it is not divisible by 2.  
 (iii) A triangle is an equilateral triangle if and only if all three sides of triangle are equal.
9. (i) If  $x \neq 3$  then  $x \neq y$  or  $y \neq 3$   
 (ii) If  $n$  is not an integer then it is not a natural number.  
 (iii) If the triangle is not equilateral then all three sides of the triangle are not equal  
 (iv) If  $xy$  is not positive integer then either  $x$  or  $y$  is not negative integer.  
 (v) If natural number  $n$  is not divisible by 2 and 3 then  $n$  is not divisible by 6.  
 (vi) The weather will not be cold if it does not snow.
10. (i) If the rectangle  $R$  is rhombus then it is square.  
 (ii) If tomorrow is Tuesday then today is Monday.  
 (iii) If you must visit Taj Mahal you go to Agra.

- (iv) If the triangle is right angle then sum of squares of two sides of a triangle is equal to the square of third side.
- (v) If the triangle is equilateral then all three angles of triangle are equal.
- (vi) If  $2x = 3y$  then  $x:y = 3:2$
- (vii) If the opposite angles of a quadrilaterals are supplementary then S is cyclic.
- (viii) If  $x$  is neither positive nor negative than  $x$  is 0.
- (ix) If the ratio of corresponding sides of two triangles are equal then triangles are similar.
11. (i) There exists (ii) For all (iii) There exists (iv) For every (v) For all (vi) There exists (vii) For all (viii) There exists (ix) There exists (x) There exists
17. C                      18. D                      19. B                      20. D
21. C                      22. B                      23. A                      24. B
25. C                      26. A                      27. C                      28. B
29. A                      30. C                      31. B                      32. A
33. C                      34. A                      35. C                      36. D
37. (i), (ii) and (iv) are statement; (iii) and (v) are not statements.

### 15.3 EXERCISE

1. 0.32                      2. 1.25                      3.  $\frac{n^2-1}{4n}$                       4.  $\frac{n}{4}$
5.  $\sqrt{\frac{n^2-1}{12}}$                       6. 3.87                      7.  $\sqrt{\frac{n_1(s_1)^2 + n_2(s_2)^2}{n_1 + n_2} + \frac{n_1 n_2 (\bar{x}_1 - \bar{x}_2)^2}{(n_1 + n_2)^2}}$
8. 5.59                      9. 7                      10. 1.38
11. Mean = 2.8, SD = 1.12                      12. 8.9
13. 5000, 251600                      14. Mean = 5.17, SD = 1.53
15. Mean = 5.5, Var. = 4.26                      16. 0.99
17. 7.08                      18. Mean =  $\frac{239}{40}$ , SD = 2.85



19. Var. = 1.16gm, S.D = 1.08 gm      20. Mean =  $a + \frac{d(n-1)}{2}$ ,  

$$\text{S.D} = d \sqrt{\frac{n^2-1}{12}}$$
21. Hashina is more intelligent and consistent
22. 10.24      23. Mean = 42.3, Var. 43.81
24. B      25. B      26. B      27. C
28. A      29. C      30. C      31. A
32. C      33. A      34. D      35. D
36. A      37. D      38. A      39. A
40. SD      41. 0, less      42. 11      43. Independent
44. Minimum      45. Least      46. greater than or equal

### 16.3 EXERCISE

1.  $\frac{1}{72}$       2.  $\frac{2}{3}$       3. 0.556
4. (a)  $5^{k-1}$  elements (b)  $\frac{5^k-1}{4}$       5.  $\frac{4}{9}$       6. 0.93
7. (a) 0.65    (b) 0.55    (c) 0.8    (d) 0    (e) 0.35    (f) 0.2
8. (a) 0.35    (b) 0.77    (c) 0.51    (d) 0.57    9. (a)  $\frac{2}{9}$     (b)  $\frac{5}{9}$
10. (a)  $p(\text{John promoted}) = \frac{1}{8}$ ,  $p(\text{Rita promoted}) = \frac{1}{4}$ ,  $p(\text{Aslam promoted}) = \frac{1}{2}$ ,  
 $p(\text{Gurpreet promoted}) = \frac{1}{8}$  (b)  $P(A) = \frac{1}{4}$
11. (a) 0.20    (b) 0.17    (c) 0.45    (d) 0.13    (e) 0.15    (f) 0.51
12. (a)  $S = \{B_1B_2, B_1W, B_2B_1, B_2W, WB_1, WB_2BW_1, BW_2, W_1B, W_1W_2, W_2B, W_2W_1\}$   
 (b)  $\frac{1}{6}$     (c)  $\frac{2}{3}$

13. (a)  $\frac{5}{143}$  (b)  $\frac{28}{143}$  (c)  $\frac{40}{143}$

14. (a)  $\frac{2}{143}$  (b)  $\frac{2}{143}$  (c)  $\frac{25}{26}$  (d)  $\frac{15}{26}$

15.  $\frac{7}{13}$

16. (a)  $p(A) = .25$ ,  $p(B) = .32$ ,  $p(A \cap B) = .17$  (b)  $p(A \cup B) = .40$  (c)  $.40$  (d)  $.68$

17. (a)  $\frac{1}{2}$  (b)  $\frac{3}{4}$  (c)  $\frac{3}{26}$  (d)  $\frac{5}{36}$

18. A

19. B

20. C

21. C

22. D

23. A

24. A

25. C

26. B

27. C

28. C

29. B

30. False

31. False

32. False

33. True

34. True

35. False

36. True

37. 0.15

38. 0.3

39.  $\overline{E} = \{2, 4, 6\}$

40. 0.2

41. 0.2

42. (a)  $\leftrightarrow$  (iv) (b)  $\leftrightarrow$  (v) (c)  $\leftrightarrow$  (i) (d)  $\leftrightarrow$  (iii) (e)  $\leftrightarrow$  (ii)

43. (a)  $\leftrightarrow$  (iv) (b)  $\leftrightarrow$  (iii) (c)  $\leftrightarrow$  (ii) (d)  $\leftrightarrow$  (i)