

# ANSWERS

## 1. ANGLE AND ITS MEASUREMENT

### Exercise : 1.1

- 1) (A) (i), (iii), (iv), (vi) are co-terminal.  
(ii), (v) are non co-terminal.  
(B) (i) III (ii) III (iii) I (iv) I (v) III  
(vi) I (vii) IV (viii) I (ix) II (x) III
- 2) (i)  $\frac{17\pi}{36}$  (ii)  $\frac{25\pi}{18}$  (iii)  $\frac{11\pi}{15}$  (iv)  $\frac{131\pi}{360}$   
(v)  $\frac{151\pi}{360}$  (vi)  $\frac{51\pi}{225}$
- 3) (i)  $105^\circ$  (ii)  $-300^\circ$  (iii)  $\left(\frac{900}{\pi}\right)^\circ$   
(iv)  $110^\circ$  (v)  $\left(\frac{-45}{\pi}\right)^\circ$  or  $14^\circ 19'$  approx"
- 4) (i)  $183^\circ 42'$  (ii)  $245^\circ 19' 48''$  (iii)  $11^\circ 27' 33''$
- 5)  $25^\circ$ ,  $\frac{5\pi}{36}$
- 6)  $30^\circ$ ,  $\frac{\pi}{6}$
- 7)  $40^\circ$ ,  $50^\circ$  and  $90^\circ$  that is  $\frac{2\pi}{9}$ ,  $\frac{5\pi}{18}$  and  $\frac{\pi}{2}$
- 8)  $420^\circ$  and  $480^\circ$
- 9)  $30^\circ$ ,  $70^\circ$  and  $80^\circ$  that is  $\frac{\pi}{6}$ ,  $\frac{7\pi}{18}$  and  $\frac{4\pi}{9}$
- 10)  $20^\circ$ ,  $60^\circ$  and  $100^\circ$  that is  $\frac{\pi}{9}$ ,  $\frac{\pi}{3}$  and  $\frac{5\pi}{9}$
- 11)  $40^\circ$ ,  $60^\circ$ ,  $140^\circ$  and  $120^\circ$
- 12)  $64^\circ$ ,  $96^\circ$ , and  $128^\circ$  that is  $\frac{16\pi}{45}$ ,  $\frac{8\pi}{15}$  and  $\frac{32\pi}{45}$

$$13) (i) 72^\circ \text{ or } \frac{2\pi}{5} \text{ and } 108^\circ \text{ or } \frac{3\pi}{5}$$

$$(ii) 60^\circ \text{ or } \frac{\pi}{3} \text{ and } 120^\circ \text{ or } \frac{2\pi}{3}$$

$$(iii) (51.43)^\circ \text{ or } \frac{2\pi}{7}$$

$$\text{and } (128.57)^\circ \text{ or } \frac{5\pi}{7}$$

$$(iv) 45^\circ \text{ or } \frac{\pi}{4} \text{ and } 135^\circ \text{ or } \frac{3\pi}{4}$$

$$14) (i) 85^\circ \quad (ii) 100^\circ \quad (iii) 162^\circ 30'$$

$$(iv) 97^\circ 30' \quad (v) 50^\circ \quad (vi) 115^\circ$$

### Exercise : 1.2

$$(1) 9\pi \text{ cm} \quad (2) 3\pi \text{ cm} \quad (3) \left(\frac{108}{\pi}\right)^\circ \text{ or } (34.40^\circ) \text{ approx} \quad (4) 4.4 \text{ cm}$$

$$(5) 4 : 5 \quad (6) 4\pi \text{ cm and } 10\pi \text{ sqcm}$$

$$(7) 18(\pi - 2\sqrt{2}) \text{ sqcm} \quad (8) \frac{225}{4} \left(\frac{\pi}{3} - 1\right) \text{ sqcm}$$

$$(9) 25 \text{ sq cm} \quad (10) 160 \text{ sq cm}$$

## MISCELLANEOUS EXERCISE - 1

$$(I) (i) B \quad (ii) B \quad (iii) A \quad (iv) D \quad (v) D \quad (vi) C$$

$$(vii) B \quad (viii) B \quad (ix) A \quad (x) C.$$

$$(II) (1) 8 \quad (2) 49 \left(\frac{\pi}{2} - 1\right) \text{ sqcm} \quad (3) 3\pi \text{ cm}$$

$$(4) 35.7 \text{ cm} \quad (5) \left(\frac{450}{\pi}\right)^\circ \quad (6) 13:22$$

- (7)  $15\pi$  cm and  $\frac{135\pi}{2}$  sq cm      (9)  $17^\circ 11' 20''$       (11)  $60^\circ, 80^\circ, 100^\circ, 120^\circ$  that is  $\frac{\pi}{3}, \frac{4\pi}{9}, \frac{5\pi}{9}, \frac{2\pi}{3}$
- (10)  $\frac{20\pi}{3}$

## 2. TRIGONOMETRY - I

### Exercise : 2.1

(1)

| $\theta$                     | $0^\circ$ | $30^\circ$           | $45^\circ$           | $60^\circ$           | $150^\circ$           | $180^\circ$ | $210^\circ$           | $300^\circ$           | $330^\circ$           |
|------------------------------|-----------|----------------------|----------------------|----------------------|-----------------------|-------------|-----------------------|-----------------------|-----------------------|
| $\sin\theta$                 | 0         | $\frac{1}{2}$        | $\frac{1}{\sqrt{2}}$ | $\frac{\sqrt{3}}{2}$ | $\frac{1}{2}$         | 0           | $\frac{1}{-2}$        | $-\frac{\sqrt{3}}{2}$ | $\frac{1}{-2}$        |
| $\cos\theta$                 | 1         | $\frac{\sqrt{3}}{2}$ | $\frac{1}{\sqrt{2}}$ | $\frac{1}{2}$        | $-\frac{\sqrt{3}}{2}$ | -1          | $-\frac{\sqrt{3}}{2}$ | $\frac{1}{2}$         | $\frac{\sqrt{3}}{2}$  |
| $\tan\theta$                 | 0         | $\frac{1}{\sqrt{3}}$ | 1                    | $\sqrt{3}$           | $-\frac{1}{\sqrt{3}}$ | 0           | $\frac{1}{\sqrt{3}}$  | $-\sqrt{3}$           | $-\frac{1}{\sqrt{3}}$ |
| $\operatorname{cosec}\theta$ | N.D.      | 2                    | $\sqrt{2}$           | $\frac{2}{\sqrt{3}}$ | 2                     | N.D.        | -2                    | $-\frac{2}{\sqrt{3}}$ | -2                    |
| $\sec\theta$                 | 1         | $\frac{2}{\sqrt{3}}$ | $\sqrt{2}$           | 2                    | $-\frac{2}{\sqrt{3}}$ | -1          | $-\frac{2}{\sqrt{3}}$ | 2                     | $\frac{2}{\sqrt{3}}$  |
| $\cot\theta$                 | N.D.      | $\sqrt{3}$           | 1                    | $\frac{1}{\sqrt{3}}$ | $-\sqrt{3}$           | N.D.        | $\sqrt{3}$            | $-\frac{1}{\sqrt{3}}$ | $-\sqrt{3}$           |

| $\theta$               | $-30^\circ$           | $-45^\circ$          | $-60^\circ$           | $-90^\circ$ | $-120^\circ$          | $-225^\circ$          | $-240^\circ$          | $-270^\circ$ | $-315^\circ$         |
|------------------------|-----------------------|----------------------|-----------------------|-------------|-----------------------|-----------------------|-----------------------|--------------|----------------------|
| $\sin\theta$           | $-\frac{1}{2}$        | $-\frac{1}{2}$       | $-\frac{\sqrt{3}}{2}$ | -1          | $-\frac{\sqrt{3}}{2}$ | $\frac{1}{\sqrt{2}}$  | $\frac{\sqrt{3}}{2}$  | 1            | $\frac{1}{\sqrt{2}}$ |
| $\cos\theta$           | $\frac{\sqrt{3}}{2}$  | $\frac{1}{\sqrt{2}}$ | $\frac{1}{2}$         | 0           | $-\frac{1}{2}$        | $-\frac{1}{\sqrt{2}}$ | $-\frac{1}{2}$        | 0            | $\frac{1}{\sqrt{2}}$ |
| $\tan\theta$           | $-\frac{1}{\sqrt{3}}$ | -1                   | $-\sqrt{3}$           | N.D.        | $\sqrt{3}$            | -1                    | $-\sqrt{3}$           | N.D.         | 1                    |
| $\operatorname{cosec}$ | -2                    | $-\sqrt{2}$          | $-\frac{2}{\sqrt{3}}$ | -1          | $-\frac{2}{\sqrt{3}}$ | $\sqrt{2}$            | $\frac{2}{\sqrt{3}}$  | 1            | $\sqrt{2}$           |
| $\sec$                 | $\frac{2}{\sqrt{3}}$  | $\sqrt{2}$           | 2                     | N.D.        | -2                    | $-\sqrt{2}$           | -2                    | N.D.         | $\sqrt{2}$           |
| $\cot$                 | $-\sqrt{3}$           | -1                   | $-\frac{1}{\sqrt{3}}$ | 0           | $\frac{1}{\sqrt{3}}$  | -1                    | $-\frac{1}{\sqrt{3}}$ | 0            | 1                    |

(2) (i) Positive (ii) Positive (iii) Negative

(3)  $\cos 4^\circ > \cos 4^c$ ,  $\cos 4^\circ > 0$ ,  $\cos 4^\circ < 0$

(4) (i) III (ii) III

(5) (i)  $\frac{1+\sqrt{2}}{2}$  (ii)  $1 + \sqrt{2}$  (iii) 0

(6)  $\sin \theta = -\frac{4}{5}$ ,  $\cos \theta = \frac{3}{5}$ ,  $\tan \theta = -\frac{4}{3}$ ,  
 $\operatorname{cosec} \theta = -\frac{5}{4}$ ,  $\sec \theta = \frac{5}{3}$ ,  $\cot \theta = -\frac{3}{4}$ ,

(7)  $-\frac{119}{120}$ ,  $\frac{144}{25}$

(8) (i)  $\frac{1}{2}$  (ii) 2

(9) (i)  $\sin \theta = -\frac{4}{5}$ ,  $\operatorname{cosec} \theta = -\frac{5}{4}$ ,  $\sec \theta = -\frac{5}{3}$

$\tan \theta = \frac{4}{3}$ ,  $\cot \theta = \frac{3}{4}$

(ii)  $\cos A = -\frac{7}{25}$ ,  $\sin A = \frac{24}{25}$ ,  $\tan A = -\frac{24}{7}$

$\operatorname{cosec} A = \frac{25}{24}$ ,  $\cot A = -\frac{7}{24}$

(iii)  $\sin x = -\frac{4}{5}$ ,  $\cos x = -\frac{3}{5}$ ,  $\operatorname{cosec} x = -\frac{5}{4}$

$\sec x = -\frac{5}{3}$ ,  $\tan x = \frac{4}{3}$

(iv)  $\sin x = -\frac{5}{13}$ ,  $\cos x = \frac{12}{13}$ ,

$\cot x = -\frac{12}{5}$ ,  $\operatorname{cosec} x = -\frac{13}{5}$ ,

$\sec x = \frac{13}{12}$

### Exercise : 2.2

(1)  $\frac{2(1+\sqrt{3})}{\sqrt{3}(\sqrt{3}+\sqrt{2})}$  (2) -5 (3)  $\frac{8}{11}$

(4) (i)  $16x^2 - 9y^2 = 144$  (ii)  $16x^2 - 9y^2 = 576$

(iii)  $x^2 + y^2 = 41$

(iv)  $\left(\frac{x-5}{6}\right)^2 - \left(\frac{y-3}{8}\right)^2 = 1$

(v)  $\left(\frac{3y-5}{3}\right)^2 - \left(\frac{2x-3}{4}\right)^2 = 1$

(5)  $\cos \theta = \pm 1$  (6)  $\frac{1}{2}$  (7)  $30^\circ$  (8)  $60^\circ$

(9) 1 (10) -1 or  $\frac{13}{12}$  (11) -8

(12) (i) (0, 3) (ii) (-1, 0)

(13) (i)  $(5\sqrt{2}, 45^\circ)$  (ii) (2,  $60^\circ$ )

(iii)  $(\sqrt{2}, 225^\circ)$  (iv) (2,  $150^\circ$ )

(14) (i)  $\frac{\sqrt{3}}{2}$  (ii)  $\frac{1}{2}$  (iii)  $\frac{1}{\sqrt{3}}$

### MISCELLANEOUS EXERCISE - 2

(I)

|   |   |   |   |   |   |   |   |   |    |
|---|---|---|---|---|---|---|---|---|----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| B | A | A | B | A | B | D | C | B | B  |

(II)

|       | 90°  | 120°                  | 225°                  | 240°                  | 270° | 315°                  | -120°                 | -150°                 | -180° |
|-------|------|-----------------------|-----------------------|-----------------------|------|-----------------------|-----------------------|-----------------------|-------|
| sin   | 1    | $\frac{\sqrt{3}}{2}$  | $-\frac{1}{\sqrt{2}}$ | $-\frac{\sqrt{3}}{2}$ | -1   | $-\frac{1}{\sqrt{2}}$ | $-\frac{\sqrt{3}}{2}$ | $-\frac{1}{2}$        | 0     |
| cos   | 0    | $-\frac{1}{2}$        | $-\frac{1}{\sqrt{2}}$ | $-\frac{1}{2}$        | 0    | $\frac{1}{\sqrt{2}}$  | $-\frac{1}{2}$        | $-\frac{\sqrt{3}}{2}$ | -1    |
| tan   | N.D. | $-\frac{1}{\sqrt{3}}$ | 1                     | $\sqrt{3}$            | N.D. | -1                    | $\sqrt{3}$            | $\frac{1}{\sqrt{3}}$  | 0     |
| cosec | 1    | $\frac{2}{\sqrt{3}}$  | $-\sqrt{2}$           | $-\frac{2}{\sqrt{3}}$ | -1   | $-\sqrt{2}$           | $-\frac{2}{\sqrt{3}}$ | -2                    | N.D.  |
| sec   | N.D. | -2                    | $-\sqrt{2}$           | -2                    | N.D. | $\sqrt{2}$            | -2                    | $-\frac{2}{\sqrt{3}}$ | -1    |
| cot   | 0    | $-\sqrt{3}$           | 1                     | $\frac{1}{\sqrt{3}}$  | 0    | 1                     | $\frac{1}{\sqrt{3}}$  | $\sqrt{3}$            | N.D.  |

| -210°                 | -300°                | -330°                |
|-----------------------|----------------------|----------------------|
| $\frac{1}{2}$         | $\frac{\sqrt{3}}{2}$ | $\frac{1}{2}$        |
| $-\frac{\sqrt{3}}{2}$ | $\frac{1}{2}$        | $\frac{\sqrt{3}}{2}$ |
| $-\frac{1}{\sqrt{3}}$ | $\sqrt{3}$           | $\frac{1}{\sqrt{3}}$ |
| 2                     | $\frac{2}{\sqrt{3}}$ | 2                    |
| $-\frac{2}{\sqrt{3}}$ | 2                    | $\frac{2}{\sqrt{3}}$ |
| $-\sqrt{3}$           | c                    | $\sqrt{3}$           |

$$(8) \cos \theta = \frac{2xy}{x^2 + y^2}, \quad \tan \theta = \frac{x^2 - y^2}{2xy}$$

$$(9) -1$$

### 3. TRIGONOMETRY - II

#### Exercise : 3.1

$$\text{Q.1 (i) } \frac{\sqrt{3}+1}{2\sqrt{2}} \quad \text{(ii) } \frac{\sqrt{3}-1}{2\sqrt{2}} \quad \text{(iii) } \frac{\sqrt{3}+1}{1-\sqrt{3}} \quad \text{(iv) } 1$$

$$\text{Q.3 (i) } \frac{33}{65} \quad \text{(ii) } \frac{-16}{65} \quad \text{(iii) } \frac{-33}{56}$$

#### Exercise : 3.2

$$\text{Q.1 (i) } -\frac{1}{2} \quad \text{(ii) } \frac{1}{\sqrt{2}} \quad \text{(iii) } \frac{1}{\sqrt{2}}$$

$$\text{(iv) } -\frac{1}{2} \quad \text{(v) } 1 \quad \text{(vi) } \frac{1}{\sqrt{3}}$$

(2) (i) Positive (ii) Negative (iii) Negative

(3) (i) IV (ii) III (iii) II

(4)  $\sin 1856 > \sin 2006$

(5)  $\sin(-310^\circ)$

(vii)  $-2$       (viii)  $-\sqrt{2}$       (ix)  $\frac{2}{\sqrt{3}}$

(x)  $-\sqrt{3}$

### Exercise : 3.3

Q.1 (i)  $\sqrt{\frac{\sqrt{2}-1}{2\sqrt{2}}}$  OR  $\frac{\sqrt{2-\sqrt{2}}}{2}$

(ii)  $\sqrt{\frac{\sqrt{2}+1}{2\sqrt{2}}}$  OR  $\frac{\sqrt{2+\sqrt{2}}}{2}$

Q.2  $\frac{-120}{169}, \frac{-119}{169}, \frac{120}{119}$

### Exercise : 3.4

Q.1 (i)  $\sin 6x + \sin 2x$       (ii)  $\sin \frac{7\pi}{12} + \sin \frac{\pi}{12}$

(iii)  $\cos 6\theta + \cos 2\theta$       (iv)  $\cos 110^\circ + \cos 40^\circ$

### MISCELLANEOUS EXERCISE - 3

Q.1 (1) B      (2) C      (2) D      (4) C      (5) C  
(6) B      (7) C      (8) B      (9) A      (10) A

## 4. DETERMINANTS AND MARTICES

### Exercise : 4.1

Q.1 (i)  $-2$       (ii)  $-10$       (iii)  $46$

(iv)  $abc + 2fgh - af^2 - bg^2 - ch^2$

Q.2 (i)  $x = 0, x = -1, x = 2$       (ii)  $x = -2$

Q.3  $x = 11, y = 52$

Q.4  $M_{11} = 11, C_{11} = 11, M_{12} = 7, C_{12} = -7,$   
 $M_{13} = -3, C_{13} = -3$

$M_{21} = -23, C_{21} = 23, M_{22} = -11, C_{22} = -11,$   
 $M_{23} = 19, C_{23} = -19$

$M_{31} = -5, C_{31} = -5, M_{32} = -5, C_{32} = 5,$   
 $M_{33} = 5, C_{33} = 5$

Q.5  $-28$

Q.6  $-2$

### Exercise : 4.2

Q.1 (i)  $0$       (ii)  $0$       (iii)  $0$

Q.5 (i)  $x = -\frac{7}{3}$       (ii)  $x = 1$  or  $2$  or  $3$ .

Q.6  $x = 0$  or  $12$

### Exercise : 4.3

Q.1 (i)  $1, 2, 3$       (ii)  $-5, 3, 4$       (iii)  $2, 2, -1$

(iv)  $-\frac{1}{4}, \frac{1}{2}, 1$ .

Q.2  $3, 5, 7$

Q.3 (1) Consistent      (ii) Not Consistent  
(iii) Consistent

Q.4 (i)  $16$       (ii)  $2$

Q.5 (i)  $16$  sq. unit      (ii)  $\frac{25}{8}$  sq. unit

(iii)  $10$  sq. unit

Q.6  $21$  sq. unit

Q.7  $1$  or  $-5$

Q.8 (i) Collinear      (ii) Non - Collinear  
(iii) Collinear

### MISCELLANEOUS EXERCISE - 4 (A)

(I)

|   |   |   |   |   |   |   |   |   |    |
|---|---|---|---|---|---|---|---|---|----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| B | B | B | B | B | C | C | D | D | C  |

(II) Q.1 (i) -113 (ii) -76

Q.2 -2

Q.3 (i) 0 (ii) 0

Q.4 (i)  $M_{11}=14, C_{11}=14, M_{12}=-4, C_{12}=4,$   
 $M_{13}=8, C_{13}=8$

$M_{21}=16, C_{21}=-16, M_{22}=-2, C_{22}=-2,$   
 $M_{23}=4, C_{23}=-4$

$M_{31}=-4, C_{31}=-4, M_{32}=5, C_{32}=-5,$   
 $M_{33}=-1, C_{33}=-1$

(ii)  $M_{11}=0, C_{11}=0, M_{12}=11, C_{12}=-11,$   
 $M_{13}=0, C_{13}=0$

$M_{21}=-3, C_{21}=3, M_{22}=-1, C_{22}=1, M_{23}$   
 $=1, C_{23}=-1$

$M_{31}=2, C_{31}=2, M_{32}=-8, C_{32}=8, M_{33}=3,$   
 $C_{33}=3$

Q.5 (i)  $-\frac{1}{3}$  or 2 (ii)  $\frac{2}{3}$

Q.9 (i) 1, 2, 1 (ii) 1, 2, 3 (iii) 1, 2, -1

(iv)  $\frac{9}{2}, -\frac{3}{2}, \frac{1}{2}$

Q.10 (i)  $\frac{1}{3}$  (ii) 5 (iii) 5

Q.11 (i) 4 (ii)  $\frac{25}{2}$  (iii)  $\frac{13}{2}$

Q.12 (i) 0 or 16 (ii) -1 or -34

Q.13 32 sq. unit

Q.14 ₹1750, ₹1500, ₹1750

### Exercise : 4.4

$$Q.1 \text{ (i) } \begin{bmatrix} 0 & \frac{1}{4} \\ \frac{1}{2} & 0 \\ 2 & \frac{1}{2} \end{bmatrix} \text{ (ii) } \begin{bmatrix} -2 & -5 \\ -1 & -4 \\ 0 & -3 \end{bmatrix} \text{ (iii) } \frac{1}{5} \begin{bmatrix} 8 & 27 \\ 27 & 64 \\ 64 & 125 \end{bmatrix}$$

Q.2 (i) Upper triangular matrix

(ii) Skew - symmetric matrix

(iii) Column matrix

(iv) row matrix

(v) scalar matrix

(vi) Lower triangular matrix

(vii) diagonal matrix

(viii) symmetric matrix

(ix) Identity matrix

(x) symmetric matrix

Q.3 (i) Singular (ii) Singular

(iii) Non-Singular (iv) Non-Singular

Q.4 (i)  $-\frac{6}{7}$  (ii) 6 (iii)  $\frac{49}{8}$

$$Q.5 \begin{bmatrix} 5 & 1 & -1 \\ 3 & 2 & 0 \end{bmatrix}$$

$$Q.6 \begin{bmatrix} 7 & 3 & 1 \\ -2 & -4 & 1 \\ 5 & 9 & 1 \end{bmatrix}$$

Q.7  $a = -4, b = \frac{3}{5}, c = -7$

Q.8  $x = -\frac{3}{2}, y = 5i, z = \sqrt{2}$

Q.9 (i) Symmetric

(ii) Neither Symmetric nor Skew Symmetric

(iii) Skew Symmetric

$$\text{Q.10 } A = \begin{bmatrix} 0 & -1 & -2 \\ 1 & 0 & -1 \\ 2 & 1 & 0 \end{bmatrix} \text{ Skew Symmetric matrix}$$

#### Exercise : 4.5

$$\text{Q.2 } \begin{bmatrix} 5 & 4 \\ -3 & 23 \end{bmatrix}$$

$$\text{Q.3 } C = \begin{bmatrix} -10 & -1 & 1 \\ 7 & -9 & 3 \\ -4 & 6 & 2 \end{bmatrix}$$

$$\text{Q.4 } X = \begin{bmatrix} -1 & \frac{2}{5} \\ \frac{6}{5} & \frac{19}{5} \\ \frac{19}{5} & \frac{26}{5} \end{bmatrix}$$

$$\text{Q.5 } X = \begin{bmatrix} \frac{3}{8} & -\frac{1}{4} \\ -\frac{3}{8} & \frac{1}{2} \end{bmatrix}, Y = \begin{bmatrix} \frac{1}{8} & \frac{1}{4} \\ -\frac{1}{8} & \frac{1}{2} \end{bmatrix}$$

$$\text{Q.6 } A = \begin{bmatrix} 3 & -\frac{14}{3} & -\frac{8}{3} \\ -2 & 1 & 3 \end{bmatrix}, B = \begin{bmatrix} 0 & -\frac{10}{3} & -\frac{16}{3} \\ 0 & 0 & 5 \end{bmatrix}$$

$$\text{Q.7 } \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

Q.8  $A - B$  is singular

$$\text{Q.9 } x = -\frac{1}{4}, y = \frac{9}{2}$$

$$\text{Q.10 } a = 1, b = 0, c = \frac{2}{5}, d = \frac{3}{5}$$

Q.11(i) 1760, 2090,

(ii) Profit of suresh book shop on P, C, M is ₹ 665, ₹675 ₹850 respectively. That of Ganesh ₹700, ₹750, ₹1020 respectively.

#### Exercise : 4.6

$$\text{Q.1 (i) } \begin{bmatrix} 6 & -12 & 9 \\ 4 & -8 & 6 \\ 2 & -4 & 3 \end{bmatrix} \quad (\text{ii}) [8]$$

Q.3  $AB \neq BA$

$$\text{Q.8 } \begin{bmatrix} -5 & -15 \\ 33 & 35 \end{bmatrix}$$

$$\text{Q.10 } \begin{bmatrix} 9 & 6 & 4 \\ 15 & 32 & -2 \\ 35 & -7 & 29 \end{bmatrix}$$

$$\text{Q.11 } \alpha = 1$$

$$\text{Q.13 } k = -7$$

$$\text{Q.17 } a = 2, b = -1$$

$$\text{Q.18 } X = \begin{bmatrix} \frac{5}{3} \\ \frac{7}{3} \\ \frac{7}{3} \end{bmatrix}$$

$$\text{Q.19 } K = 1$$

$$\text{Q.20 } x = -5/3$$

$$\text{Q.21 } x = 19, y = 12$$

$$\text{Q.22 } x = -3, y = 1, z = -1$$

$$\text{Q.24 } \text{Jay ₹104 and Ram ₹150.}$$

### Exercise : 4.7

Q.1 (i)  $\begin{bmatrix} 1 & -4 \\ 3 & 5 \end{bmatrix}$  (ii)  $\begin{bmatrix} 2 & -4 \\ 6 & 0 \\ 1 & 5 \end{bmatrix}$

Q.2  $A = \begin{bmatrix} 0 & -2 & -4 \\ 2 & 0 & -2 \\ 4 & 2 & 0 \end{bmatrix}$   $A^T = \begin{bmatrix} 0 & 2 & 4 \\ -2 & 0 & 2 \\ -4 & -2 & 0 \end{bmatrix}$

both are skew symmetric.

Q.7  $C^T = \begin{bmatrix} -16 & 14 \\ -6 & -10 \end{bmatrix}$

Q.8 (i)  $\begin{bmatrix} 7 & 8 \\ -5 & 8 \\ 12 & -18 \end{bmatrix}$  (ii)  $\begin{bmatrix} 35 & -10 \\ 25 & 15 \\ -15 & 10 \end{bmatrix}$

Q.12 (i)  $\begin{bmatrix} 4 & \frac{1}{2} \\ \frac{1}{2} & -5 \end{bmatrix} + \begin{bmatrix} 0 & \frac{-5}{2} \\ \frac{5}{2} & 0 \end{bmatrix}$

(ii)  $\frac{1}{2} \begin{bmatrix} 6 & 1 & -5 \\ 1 & -4 & -4 \\ -5 & -4 & 4 \end{bmatrix} + \frac{1}{2} \begin{bmatrix} 0 & 5 & 3 \\ -5 & 0 & 6 \\ -3 & -6 & 0 \end{bmatrix}$

### MISCELLANEOUS EXERCISE - 4 (B)

(I)

|   |   |   |   |   |   |   |   |   |    |
|---|---|---|---|---|---|---|---|---|----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| B | C | A | D | A | C | B | A | A | C  |

(II) Q.1 (i) diag  $[-1 \ 1 \ 3]$  (ii) diag  $[23 \ -32 \ -18]$

Q.2 (i)  $\begin{bmatrix} \cos \alpha & \sin \alpha & 0 \\ -\sin \alpha & \cos \alpha & 0 \\ 0 & 0 & 1 \end{bmatrix}$

(ii)  $\begin{bmatrix} 2 \cos \alpha & 0 & 0 \\ 0 & 2 \cos \alpha & 0 \\ 0 & 0 & 2 \end{bmatrix}$

Q.3 (i)  $A = \frac{1}{7} \begin{bmatrix} 3 & -4 \\ 1 & 3 \end{bmatrix}$   $B = \begin{bmatrix} -\frac{1}{7} & -\frac{1}{7} \\ \frac{2}{7} & -\frac{1}{7} \end{bmatrix}$

(ii)  $A = \frac{1}{16} \begin{bmatrix} -5 & 10 & 6 \\ 4 & 0 & 25 \end{bmatrix}$   $B = \frac{1}{16} \begin{bmatrix} 1 & -2 & 2 \\ -4 & 0 & -5 \end{bmatrix}$

Q.5  $\alpha = 60^\circ$  or  $\frac{\pi}{3}$

Q.16  $x = 2, y = 2$

Q.18  $\begin{bmatrix} 2 & -1 \\ 3 & -2 \end{bmatrix}$

Q.19 (i)  $x = 7, y = -44$  (ii)  $x = 5, y = -1$

Q.20 (i)  $x = -9, y = -3, z = 0$ .

(ii)  $x = 31, y = 53, z = 19$ .

Q.21  $AB^T = \begin{bmatrix} 8 & -7 \\ -12 & 22 \end{bmatrix}$   $A^TB = \begin{bmatrix} 2 & 0 & -4 \\ 7 & -2 & 6 \\ 15 & -6 & 30 \end{bmatrix}$

Q.25 (i)

|           | Shantaram | Kantaram |
|-----------|-----------|----------|
| Rice      | ₹ 33000   | ₹ 39000  |
| Wheat     | ₹ 28000   | ₹ 31500  |
| Groundnut | ₹ 24000   | ₹ 24000  |

(ii)

|           | Shantaram | Kantaram |
|-----------|-----------|----------|
| Rice      | ₹ 3000    | ₹ 3000   |
| Wheat     | ₹ 2000    | ₹ 1500   |
| Groundnut | ₹ 0       | ₹ 8000   |



## 5. STRAIGHT LINE

### Exercise : 5.1

- $2x - 4y + 5 = 0$
- $9x - y + 6 = 0$
- $3x^2 + 3y^2 + 4x + 24y + 32 = 0$
- $x^2 + y^2 - 11x - 11y + 53 = 0$
- $3x + 4y - 41 = 0$
- $3x^2 + 4y^2 - 4x - 11y + 33 = 0$
- (a)  $(-1, 0)$  (b)  $(0, 2)$
- (a)  $(6, 7)$  (b)  $(4, 6)$
- $(-3, 11)$
- (a)  $3X - Y + 6 = 0$   
(b)  $X^2 + Y^2 + X + 4Y - 5 = 0$   
(c)  $XY = 0$   
(d)  $Y^2 - 4X = 0$

### Exercise : 5.2

- a) 2 b)  $\frac{4}{7}$  c) not defined. d) 0.
- $-\frac{3}{2}$  3.  $\frac{1}{\sqrt{3}}$  4. 1 5. -1
- 1 8.  $k = 1$  9.  $45^\circ$

### Exercise : 5.3

- a)  $y = 5$  b)  $y = -5$  c)  $y = -1$  or  $y = 7$
- a)  $y = 3$  b)  $x = 4$
- a)  $x = 2$  b)  $y = -3$
- a)  $4x - y - 8 = 0$  b)  $x = 2$
- a)  $y = \sqrt{3}x$  b)  $y = -3x$   
c)  $x - 2y - 7 = 0$  d)  $2x - 3y + 9 = 0$   
e)  $\sqrt{3}x + y - 4\sqrt{3} - 3 = 0$   
f)  $3x - y = 0$

- $m = 1, c = -1$
- $x + y - 7 = 0$
- a)  $2x + y - 4 = 0$  b)  $2x - 5y + 14 = 0$   
c)  $2x + 4y - 13 = 0$
- a) 3,2 b)  $\frac{2}{3}, \frac{3}{2}$  c) -6,4
- $x - y + 2 = 0, 3x - y = 0$
- $x + y = 7, 4x - 3y = 0$
- A :  $5x + y - 15 = 0$  , B :  $3x + 4y - 14 = 0$ ,  
C :  $2x - 3y - 1 = 0$
- $9x + y + 7 = 0, 8x + 22y - 31 = 0, 2x - 4y + 9 = 0$
- $\left(\frac{5}{7}, \frac{4}{7}\right)$
- $3x - 4y = 25$

### Exercise : 5.4

- a) Slope  $-\frac{2}{3}$ , X-intercept 3, Y-Intercept 2  
b) Slope 3, X-intercept 3, Y-Intercept -9  
c) Slope  $-\frac{1}{2}$ , intercepts 0
- a)  $2x - y - 4 = 0$  b)  $0x + 1y - 4 = 0$   
c)  $2x + y - 4 = 0$  d)  $2x - 3y - 6 = 0$
- $(1, -3)$  5.  $\pm 24$  6.  $(1, 2)$
- $(1, -1)$  8.  $\left(\frac{5}{3}, \frac{2}{3}\right)$  9.  $(5, 5)$
- $x + 3y = 3$  11. 2 12. 4
- $\frac{2}{5}$  14.  $\frac{25}{\sqrt{117}}$  15.  $(3, 1)$  and  $(-7, 11)$
- $5y - 8 = 0$  17.  $8x + 13y - 24 = 0$
- $x - 3y + 5 = 0$
- $2x + y + 13 = 0, x - 9y + 73 = 0,$   
 $11x - 4y - 52 = 0, \left(\frac{-1}{19}, \frac{-10}{19}\right)$
- $(2, 2)$

## MISCELLANEOUS EXERCISE - 5

(I)

|   |   |   |   |   |   |   |   |   |    |
|---|---|---|---|---|---|---|---|---|----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| B | C | B | D | B | B | D | B | A | D  |

1. a) 22      b)  $\frac{5}{3}$       c) 1
2.  $y = -2x - \frac{8}{3}$ , slope = -2
3. 2
4. No, point does not satisfy the equation.
5. (d)
6. a)  $y + 3 = 0$       b)  $x = -2$   
c)  $y = 5$       d)  $x = 3$
7. a)  $y = 3$       b)  $y = 4$
8. a)  $5x - y + 7 = 0$     b)  $x = 7$     c)  $3x - 2y = 0$
9.  $x = 2$
10. 6
11.  $\frac{12}{5}$
12.  $x + y = 8$  or  $5x - 3y = 0$
13. a) BC :  $3x + y = 9$ , CA :  $x = 1$ . AB :  $x + y = 5$   
b) Median AD :  $x - y + 3 = 0$ ,  
Median BE :  $2x + y = 7$ ,  
Median CF :  $5x + y - 11 = 0$   
c)  $x - 3y + 12 = 0$ ,  $y = 5$ ,  $x - y + 2 = 0$   
d)  $x - 3y + 11 = 0$ ,  $y = 3$ ,  $x - y + 5 = 0$
14.  $3y - 7 = 0$
15.  $17x + 27y - 17 = 0$
16.  $x + 3y = 7$
17.  $-\frac{4}{3}$
18. 5
19.  $\frac{22}{9}$

20.  $3x + y = 9$  and  $x - 3y + 7 = 0$
21. -20
22.  $x - 2y + 14 = 0$ ,  $x + 2y = 32$
23.  $y = 3$ , (1, 3)
24.  $3x - 4y + 8 = 0$
25.  $3x + 9y = 13$
26.  $\left(\frac{68}{25}, \frac{-49}{25}\right)$
27. (-2, 0) and (8, 0)
28.  $2x - 9y + 85 = 0$
30.  $3\sqrt{2}$

## 6. CIRCLE

### Exercise : 6.1

- (1) (i)  $x^2 + y^2 = 16$   
(ii)  $x^2 + y^2 + 6x - 4y - 23 = 0$   
(iii)  $x^2 + y^2 - 4x + 6y - 12 = 0$   
(iv)  $x^2 + y^2 + 6x + 6y + 9 = 0$
- (2) (i) (0, 0); 5      (ii) (5, 3);  $2\sqrt{5}$   
(iii)  $\left(\frac{1}{2}, -\frac{1}{3}\right); \frac{1}{6}$
- (3) (i)  $x^2 + y^2 - 2ax - 2by + b^2 = 0$   
(ii)  $x^2 + y^2 + 4x - 6y + 4 = 0$   
(iii)  $x^2 + y^2 \pm 8x = 0$   
(iv)  $x^2 + y^2 - 6x - 2y + 6 = 0$
- (4)  $x^2 + y^2 - 16x + 20y + 83 = 0$
- (5)  $x^2 + y^2 - 2x - 4y = 0$
- (6)  $x^2 + y^2 + 8x + 8y + 16 = 0$
- (7)  $x^2 + y^2 - 4x + 5y = 0$
- (8)  $x^2 + y^2 + 6x - 6y + 47 = 0$

### Exercise : 6.2

- (1) (i) (1, -2); 3 (ii) (3, 4); 7 (iii) (3, 1), 4  
 (3)  $x^2 + y^2 - 4x - 6y - 12 = 0$

### Exercise : 6.3

- (1) (i)  $x = 3 \cos \theta$ ,  $y = 3 \sin \theta$   
 (ii)  $x = -1 + 3 \cos \theta$ ,  $y = 2 + 3 \sin \theta$   
 (iii)  $x = 3 + 5 \cos \theta$ ,  $y = -4 + 5 \sin \theta$ ,  
 (2)  $x = \frac{2}{3} + \frac{5}{3} \cos \theta$ ,  $y = -1 + \frac{5}{3} \sin \theta$   
 (3)  $3x - 2y = 0$   
 (5)  $4x - y - 18 = 0$

### MISCELLANEOUS EXERCISE - 6

(I)

|   |   |   |   |   |   |   |   |   |    |
|---|---|---|---|---|---|---|---|---|----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| C | C | A | C | A | C | D | C | B | A  |

- (II) (1)  $\left(\frac{1}{2}, -1\right), \frac{\sqrt{17}}{2}$  (2) (3, 2), 4  
 (3)  $x^2 + y^2 + 4x - 2y = 0$   
 (4)  $x^2 + y^2 - 4x - 6y = 0$   
 (6)  $x^2 + y^2 - 6y - 76 = 0$   
 (8)  $x + \sqrt{3} y + 16 = 0$   
 (9)  $x^2 + y^2 = 50$   
 (10)  $x^2 + y^2 - 4x + 6y - 3 = 0$   
 (11) (i) x-intercept = 12, r - intercept = 9  
 (ii) x-intercept = 9, r - intercept = 15  
 (12) (i)  $\left(\frac{1}{5}, \frac{-13}{5}\right)$ ,  $3x - 4y - 11 = 0$   
 (ii) (1, 2),  $x + 3y - 7 = 0$

(13) (i) (2, -4),  $y + 4 = 0$

(ii)  $\left(\frac{8}{5}, \frac{6}{5}\right)$ ,  $3x - 4y = 0$

(14) 7 (15)  $k = -8$

(16)  $3x + 2y - 26 = 0$  (17)  $x - 2y = 5$

(18)  $x + \sqrt{3} y = 10$  (19) (-3, 0)

(20) -61 (21)  $2x + y \pm 4\sqrt{5} = 0$

(22)  $3x + 2y \pm 2\sqrt{13} = 0$

(23)  $x - 5y \pm 6\sqrt{26} = 0$

(24)  $3x - y - 27 = 0$  and  $3x - y - 13 = 0$

(25)  $x^2 + y^2 = 18$

(26) (i)  $xy = 0$  (ii)  $5y^2 + 2xy = 5a^2$

(iii)  $y^2 - a^2 = c(x^2 - a^2)$

## 7. CONIC SECTIONs

### Exercise : 7.1

- 1) i.  $\left(\frac{6}{5}, 0\right)$ ,  $5x + 6 = 0$ ,  $\frac{24}{5}$ ,  $\left(\frac{6}{5}, \pm \frac{12}{5}\right)$   
 ii. (-5, 0),  $x - 5 = 0$ , 20,  $(-5, \pm 10)$   
 iii.  $\left(0, \frac{2}{3}\right)$ ,  $3y + 2 = 0$ ,  $\frac{8}{3}$ ,  $\left(\pm \frac{4}{3}, \frac{2}{3}\right)$   
 iv. (0, -2),  $y - 2 = 0$ , 8,  $(\pm 4, -2)$   
 v.  $\left(-\frac{4}{3}, 0\right)$ ,  $3x - 4 = 0$ ,  $\frac{16}{3}$ ,  $\left(-\frac{4}{3}, \pm \frac{8}{3}\right)$   
 2)  $x^2 = -20y$   
 3)  $3y^2 = 16x$   
 4)  $y^2 = -28x$   
 5) i)  $y^2 = 36x$  ii)  $y^2 = \frac{9}{2}x$   
 6) i)  $-\frac{3}{2}$  ii)  $-\frac{9}{2}$

- 7) 8  
 8) i)  $\left(\frac{1}{3}, 2\right), \frac{10}{3}$  ii)  $\left(\frac{7}{2}, -\frac{7}{2}\right), \frac{35}{8}$   
 9) (16, 8), (16, -8)  
 10) 18 units  
 11) 18 sq. units  
 12) (5, 0)  
 13)  $(1, 2), \left(1, \frac{9}{4}\right)$ ,  
 $4y - 7 = 0$ ,  
 $x = 1$   
 14) i)  $x - y + 3 = 0, 3x - 2y + 4 = 0$   
 ii)  $3x - y + 3 = 0, 3x - 2y + 12 = 0$   
 15)  $k = 24$   
 17)  $x + 2y + 4 = 0$   
 18)  $y = -3x$   
 19)  $\frac{29}{4} = 7.25\text{cm}$

### Exercise : 7.2

- (1) (a) 10, 6,  $(\pm 50)$ ,  $x = \pm \frac{a}{e}; \frac{18}{5}, 8, \frac{25}{2}$ .  
 (b)  $4, 2\sqrt{3}, (\pm 10)$ ,  $x = \pm 4, 3, 2, 8$ .  
 (c)  $2\sqrt{3}, 2, (\pm \sqrt{2}, 0)$ ,  $x = \pm \frac{3}{\sqrt{2}}, \frac{2}{\sqrt{3}}, 2\sqrt{2}, 3\sqrt{2}$ .  
 (d)  $\frac{2}{\sqrt{3}}, 1, \left(\pm \frac{1}{2\sqrt{3}}, 0\right)$ ,  $x = \pm \frac{2}{\sqrt{3}}, \frac{\sqrt{3}}{2}, \frac{1}{\sqrt{3}}, \frac{4}{\sqrt{3}}$   
 (2) (i)  $\frac{x^2}{64} + \frac{y^2}{55} = 1$  (ii)  $\frac{x^2}{25} + \frac{y^2}{9} = 1$   
 (iii)  $\frac{x^2}{9} + \frac{y^2}{8} = 1$  (iv)  $\frac{x^2}{72} + \frac{y^2}{64} = 1$   
 (v)  $\frac{x^2}{25} + \frac{y^2}{16} = 1$  (vi)  $\frac{x^2}{16} + \frac{y^2}{12} = 1$

$$(vii) 3x^2 + 5y^2 = 32 \quad (viii) \frac{x^2}{15} + \frac{y^2}{6} = 1$$

$$(ix) \frac{x^2}{9} + \frac{y^2}{5} = 1$$

$$(4) e = \frac{2\sqrt{2}}{3}$$

$$(5) e = \frac{1}{\sqrt{3}}$$

$$(7) 4 \text{ sq. unit} \quad (8) \left(\frac{16}{5}, \frac{-9}{5}\right) \quad (9) (1, 2)$$

(10) The line is a tangent and point of contact

$$\left(\frac{1}{3\sqrt{2}}, \frac{4\sqrt{2}}{3}\right).$$

$$(11) k = \pm 12\sqrt{2}$$

$$(12) (i) y + 2 = 0, 8x - y - 18 = 0$$

$$(ii) y + 2 = 0, 12x + y = 34$$

$$(iii) 5x - y = 9, x + y = 3$$

$$(iv) 6y = \pm (4x + 15)$$

$$(v) x + y = \pm \sqrt{29}$$

$$(vi) 2x - y = \pm 3,$$

$$(vii) 3x - 4y = \pm 2\sqrt{65}$$

$$(13) x^2 + y^2 = 8 \quad (14) x^2 - xy - 5 = 0$$

$$(16) x^2 - y^2 = a^2 - b^2 \quad (19) x + y = \pm 5$$

$$(20) \frac{x}{a} + \frac{y}{b} = \sqrt{2} \quad (23) 3 \text{ sq. units}$$

### Exercise : 7.4

- (1) (i) 10, 8,  $\frac{\sqrt{41}}{5}, (\pm \sqrt{41}, 0)$ ,  $x = \pm \frac{25}{41}, \frac{32}{5}$   
 (ii) 8, 10,  $\frac{\sqrt{41}}{4}, y = \pm \frac{16}{\sqrt{41}}, \frac{32}{5}$

- (iii)  $6, 8, \frac{5}{3}, (\pm 5, 0), x = \pm \frac{9}{5}, \frac{32}{3}$
- (iv)  $4, 2\sqrt{21}, \frac{5}{2}, (\pm 5, 0), x = \pm \frac{4}{5}, 21$ .
- (v)  $\frac{4}{\sqrt{3}}, 4, \sqrt{3}, \left(\pm \frac{4}{\sqrt{3}}, 0\right), x = \pm \frac{2}{3}, 4\sqrt{3}$
- (vi)  $8, 8, \sqrt{2}, (\pm 4\sqrt{2}, 0), x = \pm 2\sqrt{2}, 32$
- (vii)  $10, 6, \frac{\sqrt{34}}{5}, (0, \pm \frac{\sqrt{34}}{5}), y = \pm \frac{25}{\sqrt{34}}, \frac{18}{5}$
- (viii)  $10, 24, \frac{13}{5}, (0, \pm 13), y = \pm \frac{25}{13}, \frac{288}{5}$ .
- (ix)  $20, 10, \frac{\sqrt{3}}{2}, (\pm 5\sqrt{3}, 0), x = \pm \frac{20}{\sqrt{3}}, 10$
- (x)  $4, 4\sqrt{3}, 2, (\pm 4, 0), x = \pm 1, 12$ .
- (2)  $\frac{x^2}{24} - \frac{y^2}{25} = 1$  (3)  $e = \frac{2}{\sqrt{3}}$
- (5) (i)  $\frac{x^2}{4} - \frac{y^2}{21} = 1$  (ii)  $\frac{x^2}{16} - \frac{y^2}{9} = 1$
- (iii)  $\frac{x^2}{4} - \frac{y^2}{5} = 1$  (iv)  $\frac{8x^2}{9} - \frac{y^2}{36} = 1$
- (v)  $\frac{x^2}{9} - \frac{y^2}{27} = 1$  (vi)  $\frac{x^2}{49} - \frac{y^2}{9} = 1$
- (vii)  $\frac{9x^2}{16} - \frac{9y^2}{20} = 1$  (ix)  $\frac{x^2}{16} - \frac{y^2}{9} = 1$
- (6) (i)  $3x - \sqrt{2}y = 2; \sqrt{2}x + 3y = 3\sqrt{2} + 6$
- (ii)  $x - y = 1; x + y = 7$
- (iii)  $5x - 6\sqrt{3}y = 30; 6\sqrt{3}x + 5y = 169\sqrt{3}$
- (iv)  $3\sqrt{2}x - 4y = 12; 4x + 3\sqrt{2}y = 25\sqrt{2}$
- (v)  $5x - 4y = 16; 16x + 20y = 125$ .
- (7)  $(-6, -2)$  (8)  $2\sqrt{10}$  (9)  $x + y = \pm 4$
- (10)  $3x + 2y = \pm 4$

### MISCELLANEOUS EXERCISE - 7

(I)

|   |   |   |   |   |   |   |   |   |    |
|---|---|---|---|---|---|---|---|---|----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| A | C | A | C | A | B | C | C | B | B  |

|    |    |    |    |    |    |    |    |    |    |
|----|----|----|----|----|----|----|----|----|----|
| 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| C  | C  | B  | B  | B  | C  | B  | A  | C  | A  |

- (II) 1) i)  $\left(\frac{17}{8}, 0\right), 8x + 17 = 0, \frac{17}{2}, \left(\frac{17}{8}, \frac{17}{4}\right)$
- i)  $\left(0, \frac{6}{5}\right) 5y + 6 = 0, \frac{24}{5}, \left(\frac{12}{5}, \frac{6}{5}\right)$
- 2) i)  $(12, 12)$  ii)  $(27, -18)$  3)  $(8, 8)$  and  $(8, -8)$
- 4)  $3x + 4y + 12 = 0$
- 5)  $2x - y + 2 = 0$
- 6)  $9x - 4y + 4 = 0, x - 4y + 36 = 0$
- 8)  $x + y + 2 = 0, (2, 4), (2, -4)$
- 13) a) i)  $10, 6$  ii)  $(\pm 4, 0)$  iii)  $x = \frac{23}{4}$  iv)  $\frac{18}{5}$  v)  $8$
- vi)  $\frac{25}{2}$
- b) i)  $10, 8$  ii)  $(0, \pm 3)$  iii)  $y = \pm \frac{25}{3}$  iv)  $\frac{32}{5}$
- v)  $6$  vi)  $\frac{50}{3}$
- c) i)  $24, 10$  ii)  $(\pm 13, 0)$  iii)  $x = \pm \frac{144}{13}$  iv)  $\frac{25}{6}$
- v)  $26$  vi)  $\frac{288}{13}$
- d) i)  $8, 8$  ii)  $(\pm 4\sqrt{2}, 0)$  iii)  $x = \pm 2\sqrt{2}$  iv)  $8$
- v)  $8\sqrt{2}$  vi)  $\sqrt{2}$
- 14) i)  $\frac{x^2}{64} + \frac{y^2}{55} = 1$  ii)  $\frac{x^2}{25} + \frac{y^2}{9} = 1$
- iii)  $3x^2 + 5y^2 = 32$

$$15) e = \pm \frac{1}{\sqrt{3}} \quad 17) y = \pm 4 \text{ or } y = 8x + 2\sqrt{11}$$

$$18) 2x + 3y = 25 \quad 19) (1, 2)$$

$$20) x^2 - xy - 5 = 0$$

$$22) \text{ i) } \frac{x^2}{36} - \frac{4y^2}{25} = 1 \quad \text{ii) } \frac{x^2}{16} - \frac{y^2}{20} = 1$$

$$\text{iii) } \frac{x^2}{4} - \frac{4y^2}{9} = 1$$

$$23) \text{ i) } 17x - 2y + 17 = 0 \quad \text{ii) } 10x - 3\sqrt{3}y = 15$$

$$\text{iii) } 32x - 25y = 400\sqrt{3}$$

$$24) (3, 2) \quad 25) y = 2x \pm 4$$

$$26) k(x^2 - a^2) = 2xy$$

$$5) \text{ S.D. } = 3.76$$

$$6) (C.V.)_p = 27.27; (C.V.)_Q = 33.33;$$

i) Worker P is more consistent.

ii) Worker Q seems to be faster in completing the job.

$$7) (C.V.)_1 = 1.07 \quad (C.V.)_2 = 2.5$$

i) First department has larger bill

ii) Second department has larger variability in wages.

$$8) (C.V.)_A = 18.6; (C.V.)_B = 18.7$$

Series B is more variable

$$9) (C.V.)_A = 80; (C.V.)_B = 74.5$$

Team B is more consistent.

$$10) (C.V.)_M = 10; (C.V.)_S = 12$$

The subject Statistic shows higher variability in marks.

## 8. MEASURES OF DISPERSION

### Exercise : 8.1

$$1) 38 \quad 2) 717 \quad 3) 11 \quad 4) 5 \quad 5) 10$$

### Exercise : 8.2

$$1) \sigma^2 = 8; \sigma = 2.82$$

$$2) \sigma^2 = 380; \sigma = 19.49$$

$$3) \sigma^2 = 32.39; \sigma = 5.69$$

$$4) \sigma^2 = 4.026; \sigma = 2.006$$

$$5) \sigma^2 = 3.0275; \sigma = 1.74$$

$$6) x = 58.2; \sigma^2 = 653.76; \sigma = 25.56$$

$$7) \sigma^2 x = 41.25; \sigma x = 6.42$$

$$8) 5 \text{ and } 7$$

### Exercise : 8.3

$$1) \sigma_c = 5.15$$

$$2) \sigma_c = 3.14$$

$$3) \text{ C.V. } = 6.32$$

$$4) \text{ C.V. } = 20$$

## MISCELLANEOUS EXERCISE - 8

(I)

|   |   |   |   |   |   |   |   |   |    |
|---|---|---|---|---|---|---|---|---|----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| C | A | B | D | A | C | B | B | C | B  |

(II)

$$1) \text{ Range } = 48$$

$$2) \text{ Range } = 89$$

$$3) \text{ Range } = \text{Rs. } 30$$

$$4) \text{ Range } = 60$$

$$5) \sigma = 2.72$$

$$6) \text{ S. D. } = 14.14$$

$$7) \text{ S. D. } = 1.48$$

$$8) \text{ S. D. } = 13.42$$

$$9) \text{ S. D. } = 16.85$$

$$10) \text{ A. M. } = 72; \text{ S. D. } = 13.92$$

$$11) \text{ Mean } = 19.15; \text{ S. D. } = 4.66$$

$$12) \text{ Mean } = 41; \text{ S. D. } = 7.1$$

$$13) \text{ Number of boys } = 75$$

$$\text{combined S. D. } = 10.07$$

- 14) combined S. D. = 2.65
- 15) C.V. = 26.65
- 16)  $(C.V.)_B = 6.67$   $(C.V.)_G = 6.38$   
Series of boys is more variable
- 17)  $(C.V.)_I = 22.22$   $(C.V.)_{II} = 20.83$   
Brand-I is more variable
- 18) C.V. = 29.76
- 19) C.V. = 31.35
- 20)  $(C.V.)_x = 9.21$ ;  $(C.V.)_y = 5.91$   
The variation is greater in the area of the field.
- 21)  $(C.V.)_U = 37.67$ ;  $(C.V.)_V = 55.5$   
i) Company U gives higher average life  
ii) Company U shows greater consistency in performance.
- 22)  $(C.V.)_1 = 15.50$   $(C.V.)_2 = 19.96$   
Height shows more variability

## 9. PROBABILITY

### Exercise : 9.1

- 1)  $S = \{RR, GR, BR, PR, RG, GG, BG, PG, RB, GB, BB, PB, RP, GP, BP, PP\}$   
a)  $A = \{RR, GR, RB, RP, GR, BR, PR\}$   
b)  $B = \{RG, RB, RP, GR, GB, GP, BR, BG, BP, PR, PG, PB\}$
- 2)  $S = \{(H, 1), (H, 2), (H, 3), (H, 4), (H, 5), (H, 6), (T, 1), (T, 2), (T, 3), (T, 4), (T, 5), (T, 6)\}$   
a)  $A = \{(T, 1), (T, 3), (T, 5)\}$   
b)  $B = \{(H, 2), (H, 3), (H, 5), (T, 2), (T, 3), (T, 5)\}$   
c)  $C = \{(H, 1), (H, 4)\}$
- 3) i) 56 ii) 120 iii) 720 iv) 1140
- 4)  $S = \{(1, 1), (1, 2), (1, 3), (1, 4), (1, 5), (1, 6), (2, 1), (2, 2), (2, 3), (2, 4), (2, 5), (2, 6), (3, 1), (3, 2), (3, 3), (3, 4), (3, 5), (3, 6), (4, 1), (4, 2), (4, 3), (4, 4), (4, 5), (4, 6), (5, 1), (5, 2), (5, 3), (5, 4), (5, 5), (5, 6), (6, 1), (6, 2), (6, 3), (6, 4), (6, 5), (6, 6)\}$
- a)  $A = \{(1, 2), (2, 1), (1, 3), (2, 2), (3, 1), (1, 5), (2, 4), (3, 3), (4, 2), (5, 1), (2, 6), (3, 5), (4, 4), (5, 3), (6, 2), (3, 6), (4, 5), (5, 4), (6, 3), (6, 6)\}$
- b)  $B = \{(1, 6), (2, 5), (3, 4), (4, 3), (5, 2), (6, 1)\}$
- c)  $C = \{(1, 1), (1, 2), (1, 3), (1, 4), (1, 5), (1, 6), (3, 1), (3, 2), (3, 3), (3, 4), (3, 5), (3, 6), (5, 1), (5, 2), (5, 3), (5, 4), (5, 5), (5, 6)\}$
- d)  $D = \{(2, 1), (2, 2), (2, 3), (2, 4), (2, 5), (2, 6), (4, 1), (4, 2), (4, 3), (4, 4), (4, 5), (4, 6), (6, 1), (6, 2), (6, 3), (6, 4), (6, 5), (6, 6)\}$
- c) A and B are mutually exclusive and exhaustive.
- f) C and Dare mutually exclusive and exhaustive.
- 5) a)  $S = \{(5, 5), (5, 6), (5, 7), (5, 8), (6, 5), (6, 6), (6, 7), (6, 8), (7, 5), (7, 6), (7, 7), (7, 8), (8, 5), (8, 6), (8, 7), (8, 8)\}$
- b)  $S = \{(5, 6), (5, 7), (5, 8), (6, 5), (6, 7), (6, 8), (7, 5), (7, 6), (7, 8), (8, 5), (8, 6), (8, 7)\}$
- 6) a)  $\frac{1}{9}$  b)  $\frac{5}{12}$  c)  $\frac{1}{6}$  d)  $\frac{1}{9}$
- 7) a)  $\frac{8}{221}$  b)  $\frac{13}{102}$  c)  $\frac{12}{51}$  d)  $\frac{25}{102}$  e)  $\frac{13}{34}$
- 8) a)  $\frac{6}{5525}$  b)  $\frac{997}{1700}$  c)  $\frac{22}{425}$  d)  $\frac{16}{5525}$
- 9) a)  $\frac{1}{2}$  b)  $\frac{1}{2}$  c)  $\frac{7}{10}$
- 10) a)  $\frac{4}{25}$  b)  $\frac{8}{75}$  c)  $\frac{7}{25}$  d)  $\frac{1}{15}$
- 11) a)  $\frac{2}{7}$  12) i)  $\frac{25}{81}$  ii)  $\frac{5}{18}$
- 13) i)  $\frac{1}{6}$  ii)  $\frac{5}{6}$

- 14) i)  $\frac{1}{3}$     ii)  $\frac{2}{3}$     iii)  $\frac{1}{30}$     iv)  $\frac{4}{15}$   
 15)  $\frac{4!}{4^4} = \frac{3}{32}$     16)  $\frac{1}{105}$     17) i)  $\frac{7}{33}$     ii)  $\frac{14}{55}$

### Exercise : 9.2

- 1)  $\frac{2}{3}$     2) i) 1    ii)  $\frac{8}{13}$   
 3) i) 0.85    ii) 0.74    iii) 0.15  
 4) a)  $\frac{22}{75}$     b)  $\frac{47}{75}$   
 5) 0.69    6)  $\frac{5}{18}$   
 7) a)  $\frac{1}{4}$     b)  $\frac{3}{8}$     c)  $\frac{3}{4}$   
 8)  $\frac{1}{2}$     9)  $m = 6$   
 10) i)  $\frac{7}{33}$     ii)  $\frac{21}{25}$     11)  $\frac{33}{50}$

### Exercise : 9.3

- 1)  $\frac{2}{7}$     2)  $\frac{7}{22}$     3)  $\frac{1}{9}$   
 4) i)  $\frac{1}{17}$     ii)  $\frac{1}{16}$   
 5) a)  $\frac{17}{64}$     b)  $\frac{3}{64}$     c)  $\frac{61}{64}$     d)  $\frac{29}{64}$   
 6) i)  $\frac{9}{20}$     ii)  $\frac{11}{20}$     iii)  $\frac{9}{20}$     7)  $\frac{11}{25}$   
 8) a)  $\frac{14}{19}$  (0.733)    b)  $\frac{1}{7}$  (0.143)    c)  $\frac{5}{8}$  (0.625)  
 9) Independent  
 10) a)  $\frac{5}{32}$     b)  $\frac{23}{48}$     c)  $\frac{35}{96}$     d)  $\frac{61}{96}$   
 11) a)  $\frac{1}{4}$     b)  $\frac{1}{2}$   
 12) a)  $\frac{21}{40}$     b)  $\frac{19}{40}$     13)  $\frac{10}{21}$     14)  $\frac{1}{4}$   
 15)  $\frac{9}{169}$     16)  $\frac{901}{1680}$     18)  $\frac{1}{3}$

### Exercise : 9.4

- 1) 0.60    2) i)  $\frac{27}{52}$     ii)  $\frac{25}{52}$   
 3)  $\frac{16}{99}$     4)  $\frac{4}{5}$     5)  $\frac{12}{37}$

- 6) T = Test positive, S = Sufferer, P(T) = Total probability = 0.10425

a)  $\frac{0.00475}{0.10425}$

b)  $P(S'/T') = \frac{p(T/S)P(S)}{1 - P(T)} = \frac{0.8955}{0.8958}$

7)  $\frac{95}{127} = 0.748$     8)  $\frac{0.018}{0.166} = 0.108$

9) (a) Total Probability =  $\frac{2}{3}$     b)  $\frac{1}{2}$

10)  $\frac{20}{59}$

### Exercise : 9.5

- 1) i)  $\frac{3}{5}$     ii)  $\frac{3}{5}$     2)  $\frac{16}{21}$     3) a)  $\frac{73}{105}$     b)  $\frac{32}{105}$   
 4) a)  $\frac{61}{96}$     b)  $\frac{35}{96}$     5) 65:23    6) 2:1  
 7) 81 : 44

### MISCELLANEOUS EXERCISE - 9

(I)

|   |   |   |   |   |   |   |   |   |    |
|---|---|---|---|---|---|---|---|---|----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| D | A | A | D | B | C | D | D | C | B  |

II) 1) a)  $\frac{2}{15}$     b)  $\frac{9}{46}$     2)  $\frac{505}{1001}$     3)  $\frac{4}{7}$

4)  $\frac{1}{2}, 1, \frac{1}{3}$     5)  $\frac{6}{55}$     6)  $n(s) = \frac{12!}{(2!)^4}$

a)  $\frac{1}{66}$     b)  $\frac{1}{99}$     7)  $\frac{19}{90}$     8)  $\frac{3}{7}$

9)  $\frac{32}{49}$     10)  $\frac{16}{21}$     11) i)  $\frac{4}{5}$     ii)  $\frac{2}{3}$

12) a)  $\frac{2}{5}$     b)  $\frac{1}{4}$     c)  $\frac{3}{5}$     13)  $\frac{5}{28}$



$$14) \text{ a) } \frac{23}{60} \quad \text{b) } \frac{8}{23} \quad 15) \frac{1}{21}$$

$$17) \frac{1}{11}$$

$$18) P(\text{A win}) = \frac{6}{11}, P(\text{B win}) = \frac{5}{11}$$

$$16) P(\text{A}) = \frac{1}{3}, P(\text{B}) = \frac{1}{2}, P(\text{C}) = \frac{1}{2}$$

$$19) \frac{2}{5}$$

$$20) \frac{90}{92}$$

$$21) \frac{2}{3}$$

$$22) \frac{28}{69}$$

$$23) \frac{1}{2}$$

