ANSWERS

1. ANGLE AND IT'S 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) III (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° (ii) −300° (iii) $\left(\frac{900}{\pi}\right)^0$
(iv) 110° (v) $\left(\frac{-45}{\pi}\right)^0$ or 14°19'approx"

4) (i) 183°42' (ii) 245°19'48" (iii) 11°27'33

5) 25°, $\frac{5\pi}{36}$

6) 30°, $\frac{\pi}{6}$

7) 40°, 50° and 90° that is $\frac{2\pi}{9}$, $\frac{5\pi}{18}$ and $\frac{\pi}{2}$

8) 420° and 480°

9) 30°, 70° and 80° that is $\frac{\pi}{6}$, $\frac{7\pi}{18}$ and $\frac{4\pi}{9}$

10) 20°, 60° and 100° that is $\frac{\pi}{9}$, $\frac{\pi}{3}$ and $\frac{5\pi}{9}$

11) 40°, 60°, 140° and 120°

12) 64°, 96°, and 128° that is $\frac{16\pi}{45}$, $\frac{8\pi}{15}$ and $\frac{32\pi}{45}$

13) (i) 72° or $\frac{2\pi}{5}$ and 108° or $\frac{3\pi}{5}$
(ii) 60° or $\frac{\pi}{3}$ and 120° or $\frac{2\pi}{3}$
(iii) (51.43)° or $\frac{2\pi}{7}$
and (128.57)° or $\frac{5\pi}{7}$
(iv) 45° or $\frac{\pi}{4}$ and 135° or $\frac{3\pi}{4}$

14) (i) 85° (ii) 100° (iii) 162°30'
(iv) 97°30' (v) 50° (vi) 115°

Exercise : 1.2

(1) 9π cm (2) 3π cm (3) $\left(\frac{108}{\pi}\right)^0$ or (34.40°) approx (4) 4.4cm

(5) 4 : 5 (6) 4π cm and 10π sqcm

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

(9) 25 sq cm (10) 160 sq cm

MISCELLANEOUS EXERCISE - 1

(I) (i) B (ii) B (iii) A (iv) D (v)D (vi) C
(vii) B (viii) B (ix) A (x) C.

(II) (1) 8 (2) $49\left(\frac{\pi}{2} - 1\right)$sqcm (3) 3π cm
(4) 35.7 cm (5) $\left(\frac{450}{\pi}\right)^0$ (6) 13:22

(7) 15π cm and $\frac{135\pi}{2}$ sq cm (9) 17°11'20" (11) 60°, 80°, 100°, 120° 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)

θ	0°	30°	45°	60°	150°	180°	210°	300°	330°
sinθ	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	0	$\frac{1}{-2}$	$-\frac{\sqrt{3}}{2}$	$\frac{1}{-2}$
cosθ	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	$-\frac{\sqrt{3}}{2}$	−1	$-\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$
tanθ	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	$-\frac{1}{\sqrt{3}}$	0	$\frac{1}{\sqrt{3}}$	$-\sqrt{3}$	$-\frac{1}{\sqrt{3}}$
cosecθ	N.D.	2	$\sqrt{2}$	$\frac{2}{\sqrt{3}}$	2	N.D.	−2	$-\frac{2}{\sqrt{3}}$	−2
secθ	1	$\frac{2}{\sqrt{3}}$	$\sqrt{2}$	2	$-\frac{2}{\sqrt{3}}$	−1	$-\frac{2}{\sqrt{3}}$	2	$\frac{2}{\sqrt{3}}$
cotθ	N.D.	$\sqrt{3}$	1	$\frac{1}{\sqrt{3}}$	$-\sqrt{3}$	N.D.	$\sqrt{3}$	$-\frac{1}{\sqrt{3}}$	$-\sqrt{3}$

θ	-30°	-45°	-60°	-90°	-120°	-225°	-240°	-270°	-315°
sinθ	$-\frac{1}{2}$	$-\frac{1}{\sqrt{2}}$	$-\frac{\sqrt{3}}{2}$	−1	$-\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1	$\frac{1}{\sqrt{2}}$
cosθ	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0	$-\frac{1}{2}$	$-\frac{1}{\sqrt{2}}$	$-\frac{1}{2}$	0	$\frac{1}{\sqrt{2}}$
tanθ	$-\frac{1}{\sqrt{3}}$	−1	$-\sqrt{3}$	N.D.	$\sqrt{3}$	−1	$-\sqrt{3}$	N.D.	1
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) $\cos 4° > \cos 4^c$, $\cos 4° > 0$, $\cos 4° < 0$

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

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

$\operatorname{sce} x = \frac{13}{12}$

Exercise : 2.2

(1) $\frac{2\left(1+\sqrt{3}\right)}{\sqrt{3}\left(\sqrt{3}+\sqrt{2}\right)}$ (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° (8)60°

(9) 1 or $\frac{7}{25}$ (10) $\frac{13}{12}$ (11) -8

(12) (i) (0, 3) (ii) (−1, 0)

(13) (i) $\left(5\sqrt{2}, 45^0\right)$ (ii) $(2, 60^0)$

(iii) $\left(\sqrt{2}, 225^0\right)$ (iv) $(2, 150^0)$

(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.	$-\sqrt{3}$	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	$-\frac{1}{\sqrt{3}}$	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	$\frac{2}{\sqrt{3}}$
$-\sqrt{3}$	$\frac{1}{\sqrt{3}}$	$\sqrt{3}$

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

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

(4) sin1856 > sin 2006

(5) sin (–310°)

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

(9) –1

3. TRIGONOMETRY - II

Exercise : 3.1

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

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

Exercise : 3.2

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

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

(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) $\sin\frac{7\pi}{6} + \sin\frac{\pi}{6}$

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

MISCELLANEOUS EXERCISE - 3

Q.1 (1) B (2) C (3) 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 8 (ii) 1 or 34

Q.13 32 sq. unit

Q.14 ₹1750, ₹1500, ₹1750

Exercise : 4.4

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

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

Exercise : 4.5

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

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

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

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

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

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

Q.8 A − B is singular

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

Q.10 $a = 1$, $b = 0$, $c = \frac{2}{5}$, $d = \frac{9}{5}$

Q.11(i) 1760, 2090,

(ii) Profit of suresh book shop on P, C, M is ₹ 665, ₹ 705.50, ₹890.50 respectively. That of Ganesh ₹700, ₹750, ₹1020 respectively.

Exercise : 4.6

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

Q.3 $AB \neq BA$

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

Q.10 $\begin{bmatrix} 10 & 10 & 4 \\ 25 & 39 & 2 \\ 35 & 7 & 22 \end{bmatrix}$

Q.11 $\alpha = 1$

Q.13 $k = -7$

Q.17 $a = 2, b = -1$

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

Q.19 $K = 1$

Q.20 $x = -5/3$

Q.21 $x = 19,\ y = 12$

Q.22 $x = -3$, $y = 1$, $z = -1$

Q.24 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) $A = \frac{1}{7}\begin{bmatrix} 4 & -4 \\ 0 & 4 \end{bmatrix}$ $B = \begin{bmatrix} \frac{1}{7} & -\frac{1}{7} \\ 0 & \frac{1}{7} \end{bmatrix}$

(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 $\alpha = 60°$ 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

1. $2x - 4y + 5 = 0$
2. $9x - y + 6 = 0$
3. $3x^2 + 3y^2 + 4x - 24y + 32 = 0$
4. $x^2 + y^2 - 11x - 11y + 53 = 0$
5. $3x + 4y - 41 = 0$
6. $x^2 + y^2 - 4x - 11y + 33 = 0$
7. (a) $(-1, 0)$ (b) $(0, 2)$
8. (a) (6,7) (b) (4,6)
9. (–3, 11)
10. (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

1. a) 2 b) $\frac{4}{7}$ c) not defined. d) 0.
2. $\frac{-3}{2}$ 3. $\frac{1}{\sqrt{3}}$ 4. 1 5. 135°
7. –1 8. k = 1 9. 45°

Exercise : 5.3

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

Exercise : 5.4

1. 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
2. a) $2x - y - 4 = 0$ b) $0x + 1y - 4 = 0$
   c) $2x + y - 4 = 0$ d) $2x - 3y + 0 = 0$
4. (1, –3) 5. ±24 6. (1,2)
7. (1, –1) 8. $\left(\frac{5}{3}, \frac{2}{3}\right)$ 9.(5,5)
10. $x + 3y = 3$ 11.2 12. 4
13. $\frac{2}{5}$ 14. $\frac{25}{\sqrt{117}}$ 15. (3, 1) and (–7, 11)
16. $y + 2 = 0$ 17. $8x + 13y - 24 = 0$
18. $x - 3y + 5 = 0$
19. $2x + y + 13 = 0$, $x - 9y + 73 = 0$,
    $11x - 4y - 52 = 0$, $\left(\frac{-1}{19}, \frac{-10}{19}\right)$
20. (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) $x = \frac{2}{3} + \frac{5}{3}\cos\theta,\quad y = -1 + \frac{5}{3}\sin\theta$

(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) $5x^2 + 5y^2 + 34x + 8y - 3 = 0$

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

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, ± 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 , (± 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) 4 or 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) $\frac{29}{4}$ = 7.25cm

Exercise : 7.2

(1) (a) 10, 6, (± 4, 0), $x = \pm \frac{25}{4}$; $\frac{18}{5}$, 8, $\frac{25}{2}$.

(b) 4, $2\sqrt{3}$, (±10), x = ±4, 3, 2, 8.

(c) $2\sqrt{3}$, 2, (± $\sqrt{2}$, 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) $3x^2 + 5y^2 = 32$ (viii) $\frac{x^2}{15} + \frac{y^2}{6} = 1$

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

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

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

(6) 4 sq. unit (7) $\left(\frac{16}{5}, \frac{-9}{5}\right)$ (8) (1, 2)

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

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

(10) k = ± $12\sqrt{2}$

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

(ii) $y + 2 = 0$, $6x + y = 16$

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

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

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

(vi) $2x - y = \pm 9$

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

(12) $x^2 + y^2 = 8$ (13) $x^2 - xy - 5 = 0$

(15) $bx - ay = 0$ (17) $x + y = \pm 5$

(18) 4 sq. units

Exercise : 7.4

(1) (i) 10, 8, $\frac{\sqrt{41}}{5}$, (± $\sqrt{41}$, 0), $x = \pm\frac{25}{41}$, $\frac{32}{5}$

(ii) 8, 10, $\frac{\sqrt{41}}{4}$, (0, ± $\sqrt{41}$) $y = \pm\frac{16}{\sqrt{41}}$, $\frac{25}{2}$

(iii) 6, 8, $\frac{5}{3}$, (± 5, 0). $x = \pm\frac{9}{5}$, $\frac{32}{3}$

(iv) 4, $2\sqrt{21}$, $\frac{5}{2}$, (± 5, 0). $x = \pm\frac{4}{5}$, 21.

(v) $\frac{4}{\sqrt{3}}$, 4, 2 , $\left(\pm\frac{4}{\sqrt{3}}, 0\right)$, $x = \pm\frac{1}{\sqrt{3}}$, $4\sqrt{3}$

(vi) 8, 8, $\sqrt{2}$, $\left(\pm 4\sqrt{2}, 0\right)$, $x = \pm 2\sqrt{2}$, 8

(vii) 10,6, $\frac{\sqrt{34}}{5}$, $(0, \pm\sqrt{34})$, $y = \pm\frac{25}{\sqrt{34}}$, $\frac{18}{5}$

(viii) 10, 24, $\frac{13}{5}$, (0, ±13), $y = \pm\frac{25}{13}$, $\frac{288}{5}$.

(ix) 20, 10, $\frac{\sqrt{5}}{2}$, $(\pm\sqrt{5}, 0)$ $x = \pm\frac{20}{\sqrt{5}}$, 5

(x) 4, $4\sqrt{3}$, 2, (±4, 0), x = ±1, 12.

(2) $\frac{x^2}{24} - \frac{y^2}{25} = 1$ (3) e = 2

(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) $\frac{10x^2}{9} - \frac{y^2}{36} = 1$

(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) $3x - \sqrt{2}\ y = 2$

(ii) $x - y = 1$

(iii) $5x - 6\sqrt{3}y = 30$

(iv) $3\sqrt{2}\ x - 4y = 12$

(v) $5x - 4y = 16$

(7) (−6, −2) (8) ± 5 (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) $\left(0, \frac{6}{5}\right)$ $5y + 6 = 0$, $\frac{24}{5}$, $\left(\pm\frac{12}{5}, \frac{6}{5}\right)$

2) i) (12,12) ii) (27,−18) 3) (8,8) and (8,−8)

4) $3x + 4y + 12 = 0$

5) $x - y + 2 = 0$

6) $9x - 4y + 4 = 0$, $x - 4y + 36 = 0$

8) $x + y + 2 = 0$, (2,−4)

13) a) i) 10,6 ii)(±4,0) iii) $x = \frac{23}{4}$ iv) $\frac{18}{5}$ v) 8

vi) $\frac{25}{2}$

b) i) 10,8 ii) (±3,0) iii) $y = \pm\frac{25}{3}$ iv) $\frac{32}{5}$

v)6 vi) $\frac{50}{3}$

c) i) 24,10 ii)(±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) $e = \pm\frac{1}{\sqrt{3}}$ 17) $y+2=0$ or $8x-y-18=0$

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

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

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

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

23) i) $7x - 2y + 17 = 0$ ii) $10x - 3\sqrt{3}y = 15$

iii) $8x - 5y = 20\sqrt{3}$

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

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

8. MEASURES OF DISPERSION

Exercise : 8.1

1) 38 2) 717 3) 11 4) 5 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 and 7

Exercise : 8.3

1) $\sigma_c = 5.15$
2) $\sigma_c = 3.14$
3) C.V. = 6.32
4) C.V. = 20
5) 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) $(C.V.)_1 = 1.07$ $(C.V.)_2 = 2.5$
   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 vairablility in marks.

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) Range = 48
2) Range = 89
3) Range = Rs. 30
4) Range = 60
5) Variance = 7.44 , $\sigma = 2.72$
6) Variance = 2000 , S. D. = 44.72
7) S. D. = 1.35
8) S. D. = 13.42
9) S. D. = 16.85
10) A. M. = 72; S. D. = 12.2
11) Mean = 19.15; S. D. = 4.66
12) Mean = 41; S. D. = 7.1
13) Number of boys = 75
    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)}

e) A and B are mutually exclusive but not 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) 5/12 c) 1/6 d) 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) 1/2 b) 1/2 c)7/10

10) a) 4/25 b) 8/75 c) 7/25 d) 1/15

11) a) 2/7 12) i) 25/81 ii) 5/18

13) i) 1/6 ii) $\frac{5}{6}$

14) i) 1/3 ii) 2/3 iii) 1/30 iv) 4/15

15) $\frac{4!}{4^4} = \frac{3}{32}$ 16) 1/105 17) i) 7/33 ii) 14/55

Exercise : 9.2

1) 2/3 2) i) 1 ii) 8/13

3) i) 0.85 ii) 0.74 iii) 0.15

4) a) 22/75 b) 47/75

5) 0.69 6) 5/18

7) a) 1/4 b) 3/8 c) 3/4

8) 1/2 9) m = 6

10) i) 7/33 ii) $\frac{21}{55}$ 11) $\frac{33}{50}$

Exercise : 9.3

1) 2/7 2) 7/22 3) 1/9

4) i) 1/17 ii) 1/16

5) a) 17/64 b) 3/64 c) 61/64 d) 29/64

6) i) 9/20 ii) 11/20 iii) 9/20 7) 11/25

8) a) 14/19 (0.733) b) 1/7 (0.143) c) 5/8(0.625)

9) Independent

10) a) 5/32 b) 23/48 c) 35/96 d) $\frac{61}{96}$

11) a) 1/4 b) 1/2

12) a) 21/40 b) 19/40 13) 10/21 14) 1/4

15) 11/221 16) 901/1680 18) $\frac{1}{3}$

Exercise : 9.4

1) 0.60 2) i) 27/52 ii) 25/52

3) 16/99 4) 4/5 5) 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) $\frac{23}{48}$ 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) $\frac{1}{14}$ b) $\frac{15}{56}$ 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) a) $\frac{23}{60}$ b) $\frac{8}{23}$ 15) $\frac{1}{21}$

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

17) $\frac{1}{11}$ 18) P(A win) = $\frac{6}{11}$, P(B win) = $\frac{5}{11}$

19) $\frac{2}{5}$ 20) $\frac{90}{92}$ 21) $\frac{2}{3}$ 22) $\frac{28}{69}$

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