



# MATHS

## BOOKS - DEEPTI MATHS (TELUGU ENGLISH)

### TRANSFORMATION OF AXES

#### Solved Examples

1. The point to which the axes to be translated to eliminate  $x$  and  $y$  terms in the equation

$$3x^2 - 4xy - 2y^2 - 3x - 2y - 1 = 0 \text{ is}$$

A.  $(-2, 1)$

B.  $(-4, 3)$

C.  $(-2, 3)$

D.  $(1/10, -3/5)$

**Answer: D**



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2. The transformed equation of  $x^2 + 2y^2 + 2x - 4y + 2 = 0$  when the axes are translated to the point  $(-1, 1)$  is

A.  $x^2 + 2y^2 = 1$

B.  $x^2 + 3y^2 = 1$

C.  $x^2 - y^2 + 3 = 0$

D.  $4x^2 + 9y^2 = 36$

**Answer: A**



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3. If the two circles  $(x - 1)^2 + (y - 3)^2 = r^2$  and  $x^2 + y^2 - 8x + 2y + 8 = 0$  intersect at two distinct points, then

A.  $(3\sqrt{3}, -5)$

B.  $(-1, -5)$

C.  $(5\sqrt{3}, -7)$

D.  $(7 - \sqrt{3})$

**Answer: C**



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4. The angle of rotation of axes to remove  $xy$  terms in the equation  $9x^2 - 2\sqrt{3}xy + 3y^2 = 0$  is

A.  $\pi / 12$

B.  $\pi / 6$

C.  $\pi / 3$

D.  $5\pi / 12$

**Answer: D**



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5. The origin is shifted to  $(2,3)$  and then the axes are rotated through angle  $\theta$  in the counter clock sense. If the equation  $3x^2 + 2xy + 3y^2 - 18x - 22y + 50 = 0$  is transformed to  $4x^2 + 2y^2 - 1 = 0$ , then the angle  $\theta =$

A.  $\frac{\pi}{6}$

B.  $\frac{\pi}{3}$

C.  $\frac{\pi}{4}$

D.  $\frac{\pi}{2}$

**Answer: C**



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## Excercise 1

1. The coordinates of the point  $(3,-5)$  in the new system when the origin is shifted to  $(-2, 3)$  are

A.  $(-5,8)$

B.  $(5,-8)$

C. (4,6)

D. (3,1)

**Answer: B**



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2. If  $(7,5)$  are the coordinates of a point P in the new systems when the origin is shifted to  $(-5,3)$ , then the original coordinates of P are

A.  $(-1, 2)$



B. (1,-5)

C. (2,8)

D. (4,1)

**Answer: C**



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3. If  $(\cos \alpha, \cos \beta)$  are the new coordinates of a point P when the axes are translated to the point (1,1) then the original coordinates of P are

A.  $(2 \cos^2 \alpha / 2, 2 \cos^2 \beta / 2)$

B.  $(2 \sin^2 \alpha / 2, 2 \sin^2 \beta / 2)$

C.  $(2 \cos \alpha / 2, 2 \cos \beta / 2)$

D.  $(2 \sin \alpha / 2, 2 \sin \beta / 2)$

**Answer: A**



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4. If the point  $(3,-2)$  is transformed to  $(-2,1)$

which the origin is shifted to P, then P=

A. (3,2)

B. (5,-3)

C. (-1,2)

D. (1,-2)

**Answer: B**



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5. The point to which the origin should be shifted in order to eliminate  $x$  and  $y$  in the equation  $x^2 + y^2 + 8x - 6y + 25 = 0$  is

A. (1,3)

B. (-4,3)

C. (-1,2)

D. (1,-2)

**Answer: B**



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6. The point to which the origin should be shifted in order to eliminate  $x$  and  $y$  terms in the equation  $4x^2 + 9y^2 - 8x + 36y + 4 = 0$  is

A. (1,3)

B. (-4,3)

C. (-1,2)

D. (1,-2)

**Answer: D**



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7. The point to which the origin should be shifted in order to eliminate  $x$  and  $y$  in terms in the equation  $x^2 - y^2 + 2x + 4y = 0$  is

A. (1,3)

B. (-4,3)

C. (-1,2)

D. (1,-2)

**Answer: C**



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**8.** In order to eliminate the first degrees terms from \_\_\_\_\_ the \_\_\_\_\_ equation

$2x^2 + 4xy + 5y^2 - 4x - 22y + 7 = 0$ , the

point to which origin is to be shifted is

A. (1,-3)

B. (2,3)

C. (-2,3)

D. (1,3)

**Answer: C**



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9. The point to which the origin should be shifted in order to eliminate  $x$  and  $y$  terms in the equation  $2x^2 - 3y^2 - 12x - 6y + 5 = 0$  is

A. (3,1)

B. (1,5)

C. (1,-5)

D. (3,-1)

**Answer: D**



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10. The point to which the origin should be shifted in order to eliminate  $x$  and  $y$  in the equation  $2(x - 5)^2 + 3(y + 7)^2 = 10$  is

A. (2,0)

B. (5,-7)

C. (2,-1)

D. (2,-3)

**Answer: B**



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11. If the origin is shifted to the point (2,-2), the equation to which the equation  $(x - 2)^2 + (y + 2)^2 = 9$  transformed is

A.  $x^2 + y^2 = 9$

B.  $x^2 + 3y^2 = 1$

C.  $x^2 + y^2 - 2x + 6y = 0$

D.  $4x^2 + 9y^2 = 36$

**Answer: A**



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12. If the equation  $x^2 + y^2 - 4x - 6y - 12 = 0$  is transformed to  $x^2 + y^2 = 25$  when the axes are translated to a point then the new coordinates of  $(-3,5)$  are

A.  $(-1,7)$

B.  $(-5,2)$

C.  $(1,-7)$

D.  $(5,-2)$

**Answer: B**



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13. The point to which the axes are to translated to eliminate  $y$  term and constant term in the equation  $y^2 + 8x + 4y - 2 = 0$  is

A. (3,-2)

B.  $(3, -2/3)$

C.  $(3/4, -2)$

D.  $(2/3, -4)$

**Answer: C**



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14. If the axes are translated to the circumcenter of the triangle formed by  $(9,3)$ ,  $(-1,7)$ ,  $(-1,3)$ , then the centroid of the triangle in the new system is

A.  $(5, 5/3)$

B.  $(4,3)$

C.  $(-5/3, -2/3)$

D.  $(0,0)$

**Answer: C**



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15. The transformed equation of  $xy+2x - 5y -11=0$  when the origin is shifted to the point  $(5,-2)$  is

A.  $xy=1$

B.  $6x^2 + 5xy - 6y^2 = 0$

C.  $2x^2 + 4xy + 5y^2 = 22$

D.  $5x^2 + 4xy + 8y^2 = 9$

**Answer: A**



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16. The transformed equation of  $x^2 + 3y^2 + 4x + 18y + 30 = 0$  when the axes are transferred to the point  $(-2, -3)$  is

A.  $x^2 + 2y^2 = 1$

B.  $x^2 + 3y^2 = 1$

C.  $x^2 - y^2 + 3 = 0$

D.  $4x^2 + 9y^2 = 36$

**Answer: B**



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17. The transformed equation of  $4x^2 + 9y^2 - 8x + 36y + 4 = 0$  when the axes are translated to the point (1,-2) is

A.  $x^2 + 2y^2 = 1$

B.  $x^2 + 3y^2 = 1$

C.  $x^2 - y^2 + 3 = 0$

D.  $4x^2 + 9y^2 = 36$

**Answer: D**



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18. The transformed equation of  $2x^2 + 4xy + 5y^2 - 4x - 22y + 7 = 0$  when the axes are translated to the point  $(-2, 3)$  is

A.  $xy=1$

B.  $6x^2 + 5xy - 6y^2 = 0$

C.  $2x^2 + 4xy + 5y^2 = 22$

D.  $5x^2 + 4xy + 8y^2 = 0$

**Answer: C**



19. The transformed equation of  $5x^2 + 4xy + 8y^2 - 12x - 12y = 0$  when the axes are translated to the point  $(1, 1/2)$  is

A.  $xy=1$

B.  $6x^2 + 5xy - 6y^2 = 0$

C.  $2x^2 + 4xy + 5y^2 = 22$

D.  $5x^2 + 4xy + 8y^2 = 9$

**Answer: D**



20. If the first degree terms of  $x^2 + 4xy + y^2 - 2x + 2y - 6 = 0$  are eliminated by translation of axes then the transformed equation is

A.  $x^2 + 4xy + y^2 = 8$

B.  $x^2 + 4xy + y^2 = 6$

C.  $x^2 + 4xy + y^2 = 4$

D.  $5x^2 + 4xy + 8y^2 = 9$

**Answer: C**



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**21.** If the transformed equation of a curve is  $x^2 + y^2 + 4x + 6y + 12 = 0$  when the axes are translated to the point (2,3), then the original equation of the curve is

A.  $x^2 + y^2 + 1 = 0$

B.  $x^2 + y^2 - 1 = 0$

C.  $x^2 - y^2 - 1 = 0$

D.  $x^2 - y^2 - 1 = 0$

**Answer: B**



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**22.** If the area of a triangle is 5 s.u., then the area of the triangle when the origin is shifted to (2,-1) is

A. 2 s.u.

B. 3 s.u.

C. 4 s.u.

D. 5 s.u.

**Answer: D**



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**23.** The origin is shifted to (1,2). The equation

$y^2 - 8x - 4y + 12 = 0$  changes to  $y^2 = 4ax$

then a=

A. 1

B. 2

C.  $-2$

D.  $-1$

**Answer: B**



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**24.** By translating the axes the equation  $xy - x + 2y = 6$  has changed to  $xy = c$ , then  $c =$

A. 4

B. 5

C. 6

D. 7

**Answer: A**



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**25.** The condition that the equation  $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$  can take the form  $ax^2 - 2hxy + by^2 = 0$ , when shifting the origin is



A.  $abc + 2fgh - af^2 - bg^2 - ch^2 = 0$

B.  $2fgh - bg^2 - ch^2 = 0$

C.  $2fgh - af^2 - ch^2 = 0$

D.  $2fgh - af^2 - bg^2 = 0$

**Answer: A**



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**26.** If the axes are rotated through an angle  $45^\circ$ , the coordinates of  $(2\sqrt{2}, -3/\sqrt{2})$  in the new system are

A.  $(3\sqrt{3}, -5)$

B.  $(-1, -5)$

C.  $(5\sqrt{3}, -7)$

D.  $(7 - \sqrt{3})$

**Answer: B**



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**27.** If the coordinates of a point P are transformed to  $(\sqrt{2}, -\sqrt{2})$  when the axes are rotated through an angle  $45^\circ$ , then P

A. (2,0)

B. (-2,3)

C. (4,-6)

D. (4,-9)

**Answer: A**



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**28.** Let A be the image of (2,-1) wr.to y-axis.

Without transforming the origin, the axes are

turned through an angle of  $45^\circ$  in the clockwise direction. Then A in new system is

A.  $(1/\sqrt{2}, 3/\sqrt{2})$

B.  $(-1/\sqrt{2}, -3/\sqrt{2})$

C.  $(-3/\sqrt{2}, 1/\sqrt{2})$

D. none

**Answer: B**



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29. If the axes are rotated through an angle  $45^\circ$  in the positive direction without changing the origin, then the coordinates of the point  $(\sqrt{2}, 4)$  in the old system are

A.  $(1 - 2\sqrt{2}, 1 + 2\sqrt{2})$

B.  $(1 + 2\sqrt{2}, 1 - 2\sqrt{2})$

C.  $(2\sqrt{2}, \sqrt{2})$

D.  $(\sqrt{2}, 2)$

**Answer: A**



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30. If the coordinates of a point P are transformed to  $(2, -4\sqrt{3})$  when the axes are rotated through an angle  $60^\circ$ , then P=

A.  $(3\sqrt{3}, 5)$

B.  $(-1, -5)$

C.  $(5\sqrt{3}, -7)$

D.  $(7, -\sqrt{3})$

**Answer: D**



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**31.** The line joining the points  $A(2, 0)$  and  $B(3, 1)$  is rotated through an angle of  $45^\circ$ , about A in the anti-clockwise direction. The coordinates of B in the new position

A.  $(2, \sqrt{2})$

B.  $(\sqrt{2}, 2)$

C.  $(2, 2)$

D.  $(\sqrt{2}, \sqrt{2})$

**Answer: A**



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**32.** The angle of rotation of axes in order to eliminate  $xy$  term in the equation

$$x^2 + 2\sqrt{3}xy - y^2 = 2a^2 \text{ is}$$

A.  $\pi/6$

B.  $\pi/4$

C.  $\pi/3$

D.  $\pi/2$



**Answer: A**



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**33.** The angle of rotation of axes in order to eliminate  $xy$  term in the equation

$$2x^2 + \sqrt{3}xy + 3y^2 = 9 \text{ is}$$

A.  $\pi/6$

B.  $\pi/4$

C.  $\pi/3$

D.  $\pi/2$

**Answer: C**



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**34.** The angle of rotation of axes to remove  $xy$  term in the equation  $xy = c^2$  is

A.  $\pi / 12$

B.  $\pi / 6$

C.  $\pi / 3$

D.  $\pi / 4$

**Answer: D**



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**35.** The angle of rotation of axes to remove  $xy$  term in the equation  $9x^2 + 2\sqrt{3}xy + 7y^2 = 10$  is

A.  $\pi / 12$

B.  $\pi / 6$

C.  $\pi / 3$

D.  $5\pi / 12$

**Answer: B**



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**36.** The angle of rotation of axes to remove  $xy$  term in the equation

$$x^2 + 4xy + y^2 - 2x + 2y - 6 = 0 \text{ is}$$

A.  $\pi / 12$

B.  $\pi / 6$

C.  $\pi / 3$

D.  $\pi / 4$

**Answer: D**



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**37.** The transformed equation of  $x \cos \alpha + y \sin \alpha = p$  when the axes are rotated through an angle  $\alpha$  is

A.  $x=p$

B.  $y=p$

C.  $x+p=0$

D.  $y+p=0$

**Answer: A**



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**38.** The transformed equation of  $x \sin \alpha - y \cos \alpha = p$  when the axes are rotated through an angle  $\alpha$  is

A.  $X=p$

B.  $y=p$

C.  $x+p=0$

D.  $y+p=0$

**Answer: D**



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**39.** The transformed equation of  $2xy + a^2 = 0$  when the axes are rotated through an angle  $\pi/4$  is

A.  $x^2 + y^2 = a^2$

B.  $xy = a^2$

C.  $x^2 - y^2 + a^2$

D.  $y^2 - x^2 = a^2$

**Answer: C**



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**40.** The transformed equation of  $x^2 - y^2 = a^2$  when the axes are rotated through an angle  $\pi/4$  in clockwise direction is

A.  $2xy + a^2 = 0$

B.  $xy = a^2$

C.  $x^2 - 4y^2 = a^2$

D.  $2y^2 - x^2 + a^2 = 0$



**Answer: A**



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**41.** The transferred equation of  $x^2 + 6xy + 8y^2 = 10$  when the axes are rotated through an angle  $\pi/4$  is

A.  $15x^2 - 14xy + 3y^2 = 20$

B.  $15x^2 + 14xy - 3y^2 = 20$

C.  $15x^2 + 14xy + 3y^2 = 20$

D.  $15x^2 - 14xy - 3y^2 = 20$

**Answer: C**



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**42.** The transformed equation of  $x^2 + 4xy + y^2 - 2x + 2y - 6 = 0$  when the axes are rotated through an angle  $\pi/4$  is

A.  $3x^2 - y^2 + 2\sqrt{2}y - 6 = 0$

B.  $5x^2 + 3y^2 = 5$

C.  $5x^2 + 3y^2 = 4$

D.  $4x^2 + 3y^2 = 6$

**Answer: A**



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**43.** The transformed equation of  $9x^2 + 2\sqrt{3}xy + 7y^2 = 10$  when the axes are rotated through an angle  $\pi/6$  is

A.  $3x^2 + y^2 + 2\sqrt{2}y - 6 = 0$

B.  $5x^2 + 3y^2 = 5$

C.  $5x^2 + 3y^2 = 4$

D.  $4x^2 + 3y^2 = 6$

**Answer: B**



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**44.** The transformed equation of  $x^2 - 2\sqrt{3}xy - y^2 = 2a^2$  when the axes are rotated through an angle  $60^\circ$  is

A.  $x^2 + y^2 = a^2$

B.  $xy = a^2$

C.  $x^2 - y^2 = a^2$

D.  $y^2 - x^2 = a^2$

**Answer: D**



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**45.** The transformed equation of  $x^2 - 2\sqrt{3}xy - y^2 = 2a^2$  when the axes are rotated through an angle  $60^\circ$  is

A.  $x^2 + y^2 = a^2$

B.  $xy = a^2$

C.  $x^2 - y^2 = a^2$

D.  $y^2 - x^2 = a^2$

**Answer: D**



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**46.** When the axes are rotated through an angle  $\pi/6$ . Find the transformed equation of

$$x^2 + 2\sqrt{3}xy - y^2 = 2a^2.$$

A.  $x^2 + y^2 = a^2$

B.  $x^2 - y^2 = a^2$

C.  $x^2 + y^2 = 2a^2$

D.  $x^2 - y^2 = 2a^2$

**Answer: B**



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**47.** The transformed equation of  $x^2 - 2\sqrt{3}xy - y^2 = 2a^2$  when the axes are rotated through an angle  $60^\circ$  is

A.  $x^2 + y^2 = a^2$

B.  $xy = a^2$

C.  $x^2 - y^2 = a^2$

D.  $y^2 - x^2 = a^2$

**Answer: A**



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**48.** The transformed equation of  $3x^2 + 3y^2 + 2xy = 2$  when the coordinate axes are rotated through an angle of  $45^\circ$  is

A.  $x^2 + 2y^2 = 1$

B.  $2x^2 + y^2 = 1$

C.  $x^2 + y^2 = 1$

D.  $x^2 + 3y^2 = 1$



**Answer: B**



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**49.** The transferred equation of  $x^2 - y^2 + a^2 = 0$  when the axes are rotated through an angle  $60^\circ$  is

A.  $x^2 + 2\sqrt{3}xy - y^2 = 2a^2$

B.  $x^2 + 2\sqrt{3}xy + y^2 = 2a^2$

C.  $xy + 2a^2 = 0$

D.  $xy = 2a^2$

**Answer: A**



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**50.** The transformed equation of  $x^2 + y^2 = a^2$  when the axes are rotated through an angle  $18^\circ$  is

A.  $\sqrt{5}x^2 - 4xy + y^2 = a^2$

B.  $x^2 + 2xy - \sqrt{5}y^2 = a^2$

C.  $x^2 - y^2 = a^2$

D.  $x^2 + y^2 = a^2$

**Answer: D**



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**51.** The transformed equation of  $x^2 + y^2 = r^2$  when the axes are rotated through an angle  $36^\circ$  is

A.  $\sqrt{5}x^2 - 4xy + y^2 = r^2$

B.  $x^2 + 2xy - \sqrt{5}y^2 = r^2$

C.  $x^2 - y^2 = r^2$

D.  $x^2 + y^2 = r^2$

**Answer: D**



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**52.** The transformed equation of  $x^2/a^2 - y^2/b^2 = 1$  when the axes are rotated through an angle  $90^\circ$  is

A.  $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$

B.  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

C.  $\frac{y^2}{b^2} - \frac{x^2}{a^2} = 1$

D.  $\frac{y^2}{a^2} - \frac{x^2}{b^2} = 1$

**Answer: D**



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**53.** The transformed equation of  $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$  when the axes are rotated through an angle  $90^\circ$  is

A.

$$bX^2 - 2hXY + aY^2 + 2fX - 2gY + c = 0$$

B.

$$bX^2 + 2hXY + aY^2 + 2fX + 2gY + c = 0$$

C.

$$bX^2 - 2hXY + aY^2 - 2fX + 2gY + c = 0$$

D.  $bX^2 + 2hXY + aY^2 - 2gY + c = 0$

**Answer: A**



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**54.** The transformed equation of  $x^2 + y^2 - 4x + 6y - 12 = 0$  when the axes are rotated through an angle  $180^\circ$  is

A.  $X^2 + Y^2 + 4X - 6Y + 12 = 0$

B.  $X^2 + Y^2 + 4X - 6Y - 12 = 0$

C.  $X^2 + Y^2 - 4X - 6Y - 12 = 0$

D.  $X^2 + Y^2 - 4X - 6Y + 12 = 0$

**Answer: B**



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**55.** If the axes are rotated through, an angle  $\theta$ , the transformed equation of  $x^2 + y^2 = 25$  is

A.  $(x + y)^2 = 25$

B.  $(x - y)^2 = 25$

C.  $x^2 - y^2 = 25$

D.  $x^2 + y^2 = 25$

**Answer: D**



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**56.** If the transformed equation of a curve is

$17x^2 - 16xy + 17y^2 = 225$  when the axes are



rotated through an angle  $45^\circ$ , then the original equation of the curve is

A.  $25x^2 + 9y^2 = 225$

B.  $9x^2 + 25y^2 = 225$

C.  $25x^2 - 9y^2 = 225$

D.  $9x^2 - 25y^2 = 225$

**Answer: A**



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57. If the transferred equation of a curve is  $x^2 + 2\sqrt{3}xy - y^2 = 2a^2$  when the axes are rotated through an angle  $60^\circ$ , then the original equation of the curve is

A.  $x^2 + y^2 + a^2 = 0$

B.  $x^2 + y^2 - a^2 = 0$

C.  $x^2 - y^2 + a^2 = 0$

D.  $x^2 - y^2 - a^2 = 0$

**Answer: C**



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58. The angle of rotation of the axes so that the equation  $\sqrt{3}x - y + 5 = 0$  may be reduced to the form  $Y = \text{constant}$  is

A.  $\frac{\tan^{-1} b}{a}$

B.  $\frac{\tan^{-1} a}{b}$

C.  $\tan^{-1} a$

D.  $\tan^{-1} b$

**Answer: A**



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59. The angle of rotation of the axes so that the equation  $\sqrt{3}x - y + 5 = 0$  may be reduced to the form  $Y = \text{constant}$  is

A.  $\pi/6$

B.  $\pi/4$

C.  $\pi/3$

D.  $\pi/2$

**Answer: C**



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60. The angle of rotation of the axes so that the equation  $x + y - 6 = 0$  may be reduced in the form  $x = 3\sqrt{2}$  is

A.  $\pi / 6$

B.  $\pi / 4$

C.  $\pi / 3$

D.  $\pi / 2$

**Answer: B**



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61. The line joining two points A(2,0), B(3,1) is rotated about A in anticlockwise direction through an angle  $15^\circ$ . If B goes to C then C=

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

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

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

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

**Answer: A**



**62.** The point  $(4, 1)$  undergoes the following transformations successively

I. Reflection about the line  $y = x$

II. Translation through a distance 2 units in the direction of positive X-axis.

III. Rotation through an angle  $\frac{\pi}{4}$  about origin in the anticlock wise direction.

Then, the final position of the point is

A.  $(-\sqrt{18}, \sqrt{18})$

B.  $(-2, 3)$

C.  $(0, \sqrt{18})$

D.  $(0, 3)$

**Answer: C**



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**63.** The point  $P(1, 3)$  undergoes the following transformations successively :

(i) Reflection with respect to the line  $y = x$

(ii) Translation through 3 units along the



positive direction of the X-axis

(iii) Rotation through an angle of  $\frac{\pi}{6}$  about the origin in the clockwise direction. The final position of the point P is

A.  $\left( \frac{7}{\sqrt{2}}, -\frac{5}{\sqrt{2}} \right)$

B.  $\left( \frac{6 + \sqrt{3} - 1}{2}, \frac{6 + \sqrt{3}}{2} \right)$

C.  $\left( \frac{6\sqrt{3} - 1}{2}, \frac{6 + \sqrt{3}}{2} \right)$

D.  $\left( \frac{6\sqrt{3} + 1}{2}, \frac{\sqrt{3} - 6}{2} \right)$

**Answer: D**



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**64.** The origin is translated to  $(1,2)$  . The point  $(7,5)$  in the old system undergoes the following transformations successively.

(i) Moves to the new point under the given translation of origin

(ii) Translated through 2 units along the negative direction of the new X-axis

(iii) Rotated through an angle  $\frac{\pi}{4}$  about the origin of new system in the clockwise direction

The final position of the point  $(7,5)$  is

A.  $\left( \frac{9}{\sqrt{2}}, -\frac{1}{\sqrt{2}} \right)$

B.  $\left( \frac{7}{\sqrt{2}}, \frac{1}{\sqrt{2}} \right)$

C.  $\left( \frac{7}{\sqrt{2}}, -\frac{1}{\sqrt{2}} \right)$

D.  $\left( \frac{5}{\sqrt{2}}, -\frac{1}{\sqrt{2}} \right)$

**Answer: C**



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**Set 1**

1. If the point (3,-2) is transformed to (-2,1) which the origin is shifted to P, then P=

A. only 1 is true

B. only II is true

C. both I and II are true

D. neither I nor II are true

**Answer: A**



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2. The point to which the origin should be shifted in order to eliminate  $x$  and  $y$  terms in the equation  $4x^2 + 9y^2 - 8x + 36y + 4 = 0$  is

A. only I is true

B. only II is true

C. both I and II are true

D. neither I nor II are true

**Answer: B**



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3. The transformed equation of

$$2x^2 + 4xy + 5y^2 - 4x - 22y + 7 = 0 \quad \text{when}$$

the axes are translated to the point  $(-2, 3)$  is

A. only 1 is true

B. only II is true

C. both I and II are true

D. neither I nor II are true

**Answer: C**



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**Set 2**

1. If the transformed equation of  $6x^2 + 5xy - 6y^2 = 0$  when the axes are translated to the point  $(-1,-1)$  is  $6X^2 + 5XY - 6Y^2 + aX + bY + c = 0$  then the descending order of  $a,b,c$  is

A.  $a,b,c$

B.  $b,c,a$

C.  $a,c,b$

D.  $c,a,b$

**Answer: A**



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2. If the transformed equation of a curve is  $3X^2 + XY - Y^2 - 7X + Y + 7 = 0$  when the axes are translated to the point (1,2), then the original equation of the curve is  $3x^2 + xy - y^2 - ax + by + c = 0$ , then the ascending order of a,b,c is

A. a,b,c

B. b,c,a

C. a,c,b



D. c,a,b

**Answer: B**



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3. The transformed equation of  $x^2 + 4xy + y^2 - 2x + 2y - 6 = 0$  when the axes are rotated through an angle  $\pi/4$  is

A. a,b,c

B. b,c,a

C. a,c,b

D. c,a,b

**Answer: D**



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### Set 3

1. To remove the first degree terms in the following equation origin should be shifted to the another point then calculate the new

# origins is

I.  $x^2 - y^2 + 2x + 4y = 0$

II.  $4x^2 + 9y^2 - 8x + 36y + 4 = 0$

III.  $x^2 + 3y^2 - 2x + 12y + 1 = 0$

IV.  $2(x - 5)^2 + 3(y + 7)^2 = 10$

a) (5, -7)

b) (1, -2)

c) (-1, 2)

d) (-1, -2)

e) (-5, 7)

A. d,b,a,c

B. e,c,b,d

C. c,b,d,a

D. d,c,b,a

**Answer: C**



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## 2. Match the following

- I. The transformed equation of  $x^2 - y^2 + 2x + 4y = 0$  when the origin is shifted to the point  $(-1, 2)$  is
- II. The transformed equation of  $x^2 + 3y^2 + 4x + 18y + 30 = 0$  when the axes are translated to  $(-2, -3)$  is
- III. The transformed equation of  $4x^2 + 9y^2 - 8x + 36y + 4 = 0$  when the axes are translated to  $(1, -2)$  is
- a)  $x^2 + 3y^2 = 1$
- b)  $x^2 - y^2 + 3 = 0$
- c)  $4x^2 + 9y^2 = 36$
- d)  $2x^2 + 4xy + 5y^2 = 22$

The transformed equation of  $2x^2 + 4xy + 5y^2 - 22y + 7 = 0$  when the axes are translated to  $(-2, 3)$  is

e)  $2x^2 + 4xy + 5y^2 = 11$

A. b,a,c,e

B. a,b,c,d

C. a,b,c,e

D. b,a,c,d

**Answer: D**



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## Set 4

1. A: The transformed equation of  $x^2 - y^2 + 2x + 4y = 0$  when the origin is shifted to the point  $(-1, 2)$  is  $X^2 - Y^2 + 3 = 0$ .

R: If  $x, y$  terms are eliminated from  $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$  by shifting the origin to  $(\alpha, \beta)$  then the transformed equation is

$$ax^2 + 2hxy + by^2 + g\alpha + f\beta + c = 0$$

A. Both A and R are true and R is the correct explanation of A.

B. Both A and R are true but R is not the correct explanation of A.

C. A is true but R is false

D. A is false but R is false

**Answer: A**



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2. A: The angle of rotation to remove the  $xy$ -term in the equation  $2x^2 + \sqrt{3}xy + 3y^2 = 9$  is  $\pi/6$ .

R: The angle of rotation of the axes to eliminate  $xy$  term in the equation.

$$ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0 \quad \text{is}$$
$$\frac{1}{2} \tan^{-1}((2h)/(a - b))$$

A. Both A and R are true and R is the correct explanation of A.

B. Both A and R are true but R is not the correct explanation of A.

C. A is true but R is false

D. A is false but R is false

**Answer: D**



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**3. A:** If the transformed equation of a curve is  $9X^2 + 16Y^2 = 144$  when the axes are rotated through an angle  $45^\circ$ , then the original equation is  $25x^2 - 14xy + 25y^2 = 288$ .

**R:** If  $f(x,y)=0$  is the transformed equation of a



curve when the axes are rotate through an angle  $\theta$  then the original equation of the curve is  $f(x \cos \theta + y \sin \theta, -x \sin \theta + y \cos \theta) = 0$

A. Both A and R are true and R is the correct explanation of A.

B. Both A and R are true but R is not the correct explanation of A.

C. A is true but R is false

D. A is false but R is false

**Answer: A**





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