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Class: 11
Subject: Mathematics
Topic: Pair of Lines-2
No. of Questions: 20
Duration: 60 Min
Maximum Marks: 60

1. The acute angle between the pair of lines $11x^2 + 24xy + 4y^2 = 0$ is
   a. $\tan^{-1}\frac{2}{3}$
   b. $\tan^{-1}\frac{4}{3}$
   c. $\tan^{-1}\left(\frac{2\sqrt{188}}{15}\right)$
   d. none of these

   Sol :B

   $$acute..angle = \theta$$
   $$\tan\theta = \frac{2\sqrt{144-44}}{11+4} = \frac{4}{3}$$
   $$\theta = \tan^{-1}\frac{4}{3}$$

2. The equation of the pair of lines through origin and perpendicular to the pair of lines $2x^2 + 5xy + 2y^2 + 10x + 5y = 0$ is
   a. $2x^2 - 5xy + 2y^2 = 0$
   b. $2x^2 + 5xy - 2y^2 = 0$
   c. $2x^2 - 5xy - 2y^2 = 0$
   d. None of these

   Sol: A

   The equation of the pair of lines through origin and perpendicular to the pair of lines $2x^2 + 5xy + 2y^2 + 10x + 5y = 0$ is $2x^2 - 5xy + 2y^2 = 0$

3. If $3x^2 + xy - y^2 - 3x + 6y + k = 0$ represents a pair of lines, then k =
   a. 9
   b. -9
   c. 0
   d. None of these

Sol: B

$$given..equation..represents..a..pair..of..lines$$

$$if \begin{vmatrix} 3 & \frac{1}{2} & -\frac{3}{2} \\ \frac{1}{2} & -1 & 3 \\ -\frac{3}{2} & 3 & k \end{vmatrix} = 0$$

$$it..gives..k = -9$$

4. The combined equation of two $\pm$ lines through origin, one of them making an angle of 45^{0+} with x-axis is
   a. $x^2 + xy - y^2 = 0$
   b. $2x^2 + xy - 2y^2 = 0$
   c. $x^2 = y^2$
   d. $x^2 + y^2 = 0$

   Sol: A

$$equation..of..these..2..lines$$
$$y - 0 = \tan 45(x - 0)$$
$$y = x$$
$$and$$
$$y - 0 = \tan(90 + 45)(x - 0)$$
$$y = -x$$
$$combined..equation$$
$$(y - x)(y + x) = 0$$
$$x^2 = y^2$$

5. The angle between the lines $\sin^{2+}\alpha.y^2 - 2xy.\cos^2\alpha + (\cos^2\alpha - 1)x^2 = 0\ is$
   a. 2α
   b. α
   c. 90^0
   d. None of these

   Sol: C

$$here..a = \sin^2\alpha$$
$$h = -\cos^2\alpha$$
$$b = \cos^2\alpha - 1$$
$$reqd..angle = \theta$$
$$\tan\theta = \frac{2\sqrt{\cos^4\alpha - \sin^2\alpha(\cos^2\alpha - 1)}}{\sin^2\alpha + \cos^2\alpha - 1} = \infty$$
$$\theta = 90$$

6. The lines xy + x + y+1 =0 and x + ky + 3=0 are concurrent .Then k =
   a. 2
   b. -2
   c. 0
   d. None of these

   Sol: A

$$xy + x + y + 1 = 0$$
$$x(y+1) + (y+1) = 0$$
$$x + 1 = 0$$
$$y + 1 = 0$$
$$their..point..of..intersection(-1,-1)$$
$$x + ky + 3 = 0$$
$$passes..through(-1,-1)$$
$$-1 - k + 3 = 0$$
$$-k + 2 = 0$$
$$k = 2$$

7. The distance between the parallel lines $9x^2 - 24xy + 16y^2 + 21x - 28y + 10 = 0$ is
   a. 0.3
   b. 0.6
   c. 0.9
   d. None of these

   Sol: B

lines $9x^2 - 24xy + 16y^2 + 21x - 28y + 10 = 0$

$(3x-4y+5)(3x-4y+2)=0$

$$dis\ \tan ce..between..the..parallel..lines = \frac{5}{\sqrt{9+16}} - \frac{2}{\sqrt{9+16}} = 3/5 = 0.6$$

8. If $ax^2 + 6xy + hy^2 - 10x + 10y - 6 = 0$ represents a pair of $\perp$ lines , then $|a| =$
   a. 6
   b. 2
   c. 4
   d. None of these

   Sol: A

   If it represents a pair of perpendicu lar lines then $a + h = 0$ $|a| = 6$

9. The distance between the pair of parallel lines $9x^2 - 6xy + y^2 + 2gx - 6y + 8 = 0$ is
   a. $\frac{1}{\sqrt{10}}$
   b. $\frac{2}{\sqrt{10}}$
   c. $\frac{1}{5}$
   d. None of these

   Sol: D

$$9x^2 - 6xy + y^2 + 2gx - 6y + 8 = 0$$

$$(3x - y)^2 + 6(3x - y) + 8 = 0$$

$$(3x - y + 2)(3x - y + 4) = 0$$

$$dis\ \tan ce = \frac{4}{\sqrt{3^2+1}} - \frac{2}{\sqrt{3^2+1}} = \frac{2}{\sqrt{10}}$$

$$when..g = 9$$

$$then..dis\ \tan ce = \frac{2}{\sqrt{10}}$$

$$but..when..g..is..not..given$$

$$then..answer\ 4$$

10. The equation of the line common to the pair of lines $(a^2-b^2)x^2+(b^2-c^2)xy+(c^2-a^2)y^2=0$ and $(p^2-q^2)x^2+(q^2-r^2)xy+(r^2-p^2)y^2=0$ is
    a. $y-x=0$
    b. $x+y=0$
    c. $x+y(p+q)(p-q)$
    d. None of these

    Sol: A

    Take. Option $y=x$ putting in the first equation

$$(a^2-b^2)x^2+(b^2-c^2)x^2+(c^2-a^2)x^2$$
$$=(a^2-b^2+b^2-c^2+c^2-a^2)x^2=0x^2=0$$
$$put...y=x..in..the..\sec ond..equation$$
$$we..have(p^2-q^2+q^2-r^2+r^2-p^2)x^2=0$$
$$therefore...y-x=0..is..the..commonline$$

11. If the angel between the pair of lines $x^2+kxy+y^2=0$ is $\frac{\pi}{3}$, then k =
    a. ± 2
    b. 4
    c. ± 4
    d. None of these

    Sol: C

$$\tan\frac{\pi}{3}=\frac{2\sqrt{\frac{k^2}{2^2}-1}}{2}=\frac{\sqrt{k^2-4}}{2}=\sqrt{3}$$
$$k=\pm 4$$

12. If m_1 and m_2, $m_1 > m_2$ are the slopes of the lines $5x^2-8xy+3y^2=0$, m1 : m2 =
    a. 5 : 1
    b. 5 : 4
    c. 5 :3
    d. None of these

    Sol: C

$$5x^2 - 8xy + 3y^2 = 0$$

$$x = \frac{8y \pm \sqrt{64y^2 - 4.5.3y^2}}{2.5} = y, \frac{6y}{10}$$

$lines..are$

$$x = y$$

$$x = \frac{3y}{5} \Rightarrow y = \frac{5x}{3}$$

$ratio..of..2..slopes$

$$\frac{5}{3} : 1$$

$$5 : 3$$

13. The lines $12x^2 + 7xy - 12y^2 = 0$ and $12x^2 + 7xy - 12y^2 - x + 7y - 1 = 0$ form a square, Then the equation of the diagonal, not passing through origin, is
    a. x-7y+1=0
    b. 12x-7y+5=0
    c. x+y=2
    d. None of these

    Sol: A

$$12x^2 + 7xy - 12y^2 - x + 7y - 1 - (12x^2 + 7xy - 12y^2) = 0$$

$$x - 7y + 1 = 0$$

14. The distance between the pair of parallel lines $9x^2 - 24xy + 16y^2 + 3ax - 4ay = 0$ is 3, then the value of |a| is
    a. 3
    b. 5
    c. 7
    d. 15

    Sol: D

$(3x-4y)^2+a(3x-4y)=0$

$(3x-4y)(3x-4y+a)=0$

$dis\ \tan ce..between...them$

$$=\frac{a}{\sqrt{9+16}}-\frac{0}{\sqrt{9+16}}=\frac{a}{5}$$

$given..that$

$$\frac{a}{5}=3$$

$$|a|=15$$

15. The combined equation of the pair of lines passing through origin and inclined at an angle 30^0 and 60^0 to the +ve direction of x – axis is
    a. $\sqrt{3}(x^2+y^2)=4xy$
    b. $x^2+\sqrt{3}y^2=2xy$
    c. $4\,(x^2+y^2)=\sqrt{3}xy$
    d. $x^2+y^2=3xy$

    Sol: A

    $lines.are$

    $y-0=\tan 30(x-0)$

    $$y=\frac{x}{\sqrt{3}}$$

    $y=\sqrt{3}x$

    $combined...equation$

    $(x-\sqrt{3}y)(y-\sqrt{3}x)=0$

    $xy-\sqrt{3}y^2-\sqrt{3}x^2+3xy=0$

    $4xy=\sqrt{3}(x^2+y^2)$

16. The equation of the pair of lines through (2,3) and ⊥ to the pair of lines $2x^2-4xy+3y^2=0$ are
    a. $3x^2-4xy+2y^2=0$
    b. $3\,(x-2)^2+4(x-2)\,(y-3)+2\,(y-3)^2=0$
    c. $3\,(x-2)^2+4(x-2)\,(y-3)-2\,(y-3)^2=0$
    d. None of these

Sol: B

The equation of the pair of lines through (2,3) and ⊥ to the pair of lines $2x^2 - 4xy + 3y^2 = 0$ are $3(x-2)^2 + 4(x-2)(y-3) + 2(y-3)2 = 0$

17. The difference between the slopes of the lines given by $9x^2 - 12xy + 4y^2 = 0$ is
    a. 3
    b. -3
    c. 2
    d. 0

    Sol: D

    Here $h^2 - ab = 0$

    Therefore these 2 straight lines coincident Difference between the slopes $= 0$

18. The angle between the pair of lines $x^2 - xy - 6y^2 - 7x + 31y - 18 = 0$ is
    a. $\tan^{-1}\frac{4}{3}$
    b. $\tan^{-1}\frac{3}{4}$
    c. 60^0
    d. 45^0

    Sol: D

$$\tan\theta = \frac{2\sqrt{h^2 - ab}}{a+b} = \frac{2\sqrt{\frac{1}{4}+6}}{1-6} = \frac{2\sqrt{\frac{25}{4}}}{-5} = \frac{-5}{-5} = 1$$

$$\theta = 45$$

19. The triangle formed by the lines $x^2 - 9y^2 = 0$ and the line $x = 5$ is
    a. Isosceles
    b. Equilateral
    c. Right angled
    d. None of these

    Sol: A

$lines..are(x+3y)=0$

$x-3y=0....x=5$

$x^2-9y^2=0$

$angle..between..these..2..lines$

$\theta=\tan^{-1}\frac{2\sqrt{9}}{1-9}=\tan^{-1}(3/4)$

$\theta\neq 60\,\text{deg}\,ree$

$isosceles..triangle$

20. The combined equation of the pair of lines passing through (2,1) and parallel to the coordinate axes is
    a. xy – x – 2y + 2=0
    b. xy = 2
    c. xy + x+2y+2=0
    d. None of these

    Sol: A

    Lines are x-2=0, y-1=0

    Combine equation (x-2) (y-1) = 0

    xy – x-2y + 2 = 0