MATHS

BOOKS - MTG WBJEE MATHS (HINGLISH)

CONIC SECTIONS

Wb Jee Workout Category 1 Single Option Correct Type

1. The equation of hyperbola referred to its axes as axes of coordinate whose distance between the foci is 20 and eccentricity equals $\sqrt{2}$ is

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

B. $x^2 - y^2 = 50$

C. $x^2 - y^2 = 125$

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

Answer: B

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2. The equation of the ellipse with its centre at $(1, 2)$, one focus at $(6, 2)$ and passing through the point $(4, 6)$ is-

A. $\frac{(x-1)^2}{45}+\frac{(y-2)^2}{20}=1$

B. $\frac{(x+1)^2}{45}+\frac{(y+2)^2}{20}=1$

C. $\frac{(x-1)^2}{20}+\frac{(y-2)^2}{45}=1$

D. $\frac{(x+1)^2}{20}+\frac{(y+2)^2}{45}=1$

Answer: A

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3. If the eccentric angles of the ends of a focal chord of the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1(a>b)$ are θ_1 and θ_2, then value of $\tan\frac{\theta_1}{2}\tan\frac{\theta_2}{2}$ equals

A. $\frac{e-1}{e+1}$

B. $\frac{e-1}{e^2+1}$

C. $\frac{e+1}{e-1}$

D. $\frac{e^2+1}{e-1}$

Answer: A

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4. For the ellipse $4x^2 + 5y^2 - 16x - 30y + 60 = 0$, which of the following is true ?

A. Centre=(2,3)

B. Length of major axes is1

C. Eccentricity=$\frac{1}{\sqrt{5}}$

D. All of these

Answer: D

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5. The equation of common tangent to the parabola's $y^2 = 32x$ and $x^2 = 108y$ is

A. $2x + 3y + 12 = 0$

B. $2x + 3y + 36 = 0$

C. $2x + 3y - 36 = 0$

D. $2x + 3y - 12 = 0$

Answer: B

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6. If the line x + y - 1 = 0 touches the parabola $y^2 = kx$, thn the value of k, is

A. 4

B. -4

C. 2

D. -2

Answer: B

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7. Equation of tangent at the vertex of parabola

$x^2 + 8x + 4y = 0$ is

A. $x = 4$

B. $x = -4$

C. $y = 4$

D. $y = -4$

Answer: C

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8. The equation of parabola whose latus rectum is 2 units, axis of line is x+y-2=0 and tangent at the vertex is x-y+4=0 is given by

A. $(x+y-2)^2 = 4\sqrt{2}(x-y+4)^2$

B. $(x-y-4)^2 = 4\sqrt{2}(x+y-2)$

C. $(x+y-2)^2 = 2\sqrt{2}(x-y+4)$

D. none

Answer: C

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9. The co-ordinates of the point on the parabola $y = \left(x^2 + 10x + 3\right)$ which is nearest to the straight line $y = 4x - 7$ are

A. $(3, 18)$

B. $(18, 3)$

C. $(-3, -18)$

D. $(-18, -3)$

Answer: C

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10. The equation of the chord joining two points (x_1, y_1) and (x_2, y_2) on the rectangular hyperbola $xy = c^2$, is

A. $\frac{x}{x_1 - x_2} + \frac{y}{y_1 - y_2}$

B. $\frac{x}{y_1 - y_2} + \frac{y}{x_1 - x_2} = 1$

C. $\frac{x}{x_1 + x_2} + \frac{y}{y_1 + y_2} = 1$

D. $\frac{x}{y_1 + y_2} + \frac{y}{x_1 + x_2} = 1$

Answer: C

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11. The equation of the circle drawn with the focus of the parabola $(x-1)^2 - 8y = 0$ as its centre and touching the parabola at its vertex is

A. $(x-1)^2+(y-2)^2=5$

B. $(x-2)^2+(y-1)^2=5$

C. $(x-1)^2+(y-2)^2=4$

D. none

Answer: C

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12. Find the length of the latus rectum of the parabola

$169\left\{(x-1)^2+(y-3)^2\right\}=(5x-12y+17)^2$

.

A. $\frac{14}{13}$

B. $\frac{28}{13}$

C. $\frac{12}{13}$

D. none

Answer: B

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13. The number of tangents (real) that can be drawn to the ellipse $5x^2 + 7y^2 = 40$ passing through (3,5) is

A. 4

B. 3

C. 1

D. 2

Answer: D

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14. The number of values of c such that the straight line $y = 4x + c$ touches the curve $\frac{x^2}{4} + y^2 = 1$ is k then,k is

A. 0

B. 4

C. 7

D. none

Answer: D

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15. If the curve $xy = R^2 - 16$ represents a rectangular hyperbola whose branches lies only in the quadrant in which abscissa & ordinate are possite in sign but not equal in magnitude, then

A. $|R| < 4$

B. $|R| \geq 4$

C. $|R| = 4$

D. none

Answer: A

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16. For the second degree equation

$ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$

which of the following is not true ?

A. represent a pair of straight line if

$$\Delta = \begin{vmatrix} a & h & g \\ h & b & f \\ g & f & c \end{vmatrix} = 0$$

B. represent a pair of perpendicular lines if

$\Delta = 0$ and $a + b = 0$

C. represent a rectangular hyperbola if

$\Delta \neq 0, a + b = 0$ and $h^2 > ab$

D. none

Answer: D

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17. Find a point on the curve $x^2 + 2y^2 = 6$, whose distance from the line $x + y = 7$, is minimum.

A. (1,2)

B. (-2,-1)

C. (1,-2)

D. (2,1)

Answer: D

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18. If e_1 is the eccentricity of the conic $9x^2 + 4y^2 = 36$ *and* e_2 is the eccentricity of the conic $9x^2 - 4y^2 = 36$ then $e12 - e22 = 2$ b. $e22 - e12 = 2$ c. $2 < 322 - 312 < 3$ d. $e22 - e12 > 3$

A. $e_1^2 + e_2^2 = 2$

B. $3 < e_1^2 + e_2^2 < 4$

C. $e_1^2 + e_2^2 > 4$

D. none

Answer: B

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19. If e is the eccentricity of $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ & θ be the angle between the asymptotes, then $\sec\theta/2$ equals

A. e^2

B. $1/e$

C. $2e$

D. e

Answer: D

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20. Set of values of 'h' for which the number of distinct common normals of $(x-2)^2 = 4(y-3)$ and $x^2 + y^2 - 2x - hy - c = 0 (c > 0)$ is 3, is

A. $(2, \infty)$

B. $(4, \infty)$

C. $(2, 4)$

D. none

Answer: B

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21. The eccentricity of the conic $3x^2 + 4y^2 - 6x - 8y + 4 = 0$ is

A. $\frac{1}{2}$

B. $1/\sqrt{2}$

C. $\sqrt{2}$

D. none

Answer: A

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22. The eccentricity of an ellipse, the length of whose minor axis is equal to the distance between the foci, is

A. $\frac{1}{2}$

B. $\frac{1}{3}$

C. $1/\sqrt{3}$

D. $1/\sqrt{2}$

Answer: D

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23. The curve described parametrically by $x = t^2 + t + 1, y = t^2 - t + 1$ represents :

A. a parabola with latus rectum 4

B. an ellipse centre at (1,2)

C. a parabola with latus rectum 2

D. an hyperbola with eccentricity $\sqrt{2}$

Answer: C

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24. The coordinates of the vertex of the parabola $y^2 = 4(x + y)$ is

A. (0,0)

B. (2,1)

C. (-1,2)

D. (1,2)

Answer: C

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25. If ASC is a focal chord of the parabola $y^2 = 4ax$ and $AS = 5, SC = 9$, then length of latus rectum of the parabola equals

A. $\frac{90}{7}$

B. $\frac{7}{90}$

C. $\frac{45}{14}$

D. $\frac{14}{45}$

Answer: A

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26. The line $x = 2y$ intersects the ellipse $\frac{x^2}{4} + y^2 = 1$ at the points P and Q. The equation of the circle with PQ as diameter is

A. $x^2 + y^2 = \frac{1}{2}$

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

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

D. $x^2 + y^2 = \frac{5}{2}$

Answer: D

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27. The transverse axis of a hyperbola is along the x-axis and its length is 2a. The vertex of the hyperbola bisects the line segment joining the

centre and the focus. The equation of the hyperbola is

A. $6x^2 - y^2 = 3a^2$

B. $x^2 - 3y^2 = 3a^2$

C. $x^2 - 6y^2 = 3a^2$

D. $3x^2 - y^2 = 3a^2$

Answer: D

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28. Let the foci of the ellipse $\frac{x^2}{9} + y^2 = 1$ subtend a right angle at a point P. Then, the locus of P is (A) $x^2 + y^2 = 1$ (B) $x^2 + y^2 = 2$ (C) $x^2 + y^2 = 4$ (D) $x^2 + y^2 = 8$

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

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

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

D. $x^2 + y^2 = 8$

Answer: D

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29. The locus of the middle points of all chords of the parabola $y^2 = 4ax$ passing through the vertex is

A. a straight line

B. an ellipse

C. a parabola

D. a circle

Answer: C

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30. The coordinates of the focus of the parabola described parametrically by $x = 5t^2 + 2. y = 10t + 4$ are

A. (7,4)

B. (3,4)

C. (3,-4)

D. (-7,4)

Answer: A

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Wb Jee Workout Category 2 Single Option Correct Type

1. If the equation of a chord of the parabola $y^2 = 4ax$ is $y = mx + c$, then its mid point is

A. $\left(\frac{2a - mc}{m^2}, \frac{2a}{m}\right)$

B. $\left(\frac{2a + mc}{m^2}, \frac{2a}{m}\right)$

C. $\left(\frac{2a - mc}{m^2}, \frac{-2a}{m}\right)$

D. $\left(\frac{2m - ac}{m^2}, \frac{2a}{m}\right)$

Answer: A

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2. The ,locus of the point of intersection of two perpendicular tangents to the parabola $y^2 = 4ax$ is

A. x+a=0

B. x-a=0

C. y+a=0

D. y-a=0

Answer: A

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3. If the parabola $y = x^2 + bx + c$, touches the straight line x=y at the point (1,1) then the value of b+c is

A. 0

B. 2

C. -2

D. 3

Answer: A

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4. The mid point of the chord 16x+9y=25 to the ellipse $\frac{x^2}{9}+\frac{y^2}{16}=1$ is

A. (1,-1)

B. (-1,1)

C. (-1,1)

D. (1,1)

Answer: D

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5. If the normal at an end of a latus rectaum of an ellipse passes through an extremity of the minor axis then the eccentricity of the ellispe satisfies .

A. $e^2 + e + 1 = 0$

B. $e^4 + e^2 + 1 = 0$

C. $e^4 - e^2 - 1 = 0$

D. $e^4 + e^2 - 1 = 0$

Answer: D

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6. Equation of pair of tangents to the ellipse $9x^2 + 25y^2 = 225$ from a point (4,2) is

A.

$$9x^2 + 25y^2 - 225 = \left(\frac{36x + 50y - 225}{\sqrt{19}}\right)^2$$

B.

$$9x^2 + 25y^2 - 225 = \left(\frac{36x + 25y - 225}{15\sqrt{19}}\right)^2$$

C.

$$\left(\frac{x^2}{25} + \frac{y^2}{9} - 1\right)19 = \left(\frac{36x + 25y - 225}{15}\right)^2$$

D. none

Answer: A

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7. If the tangent drawn at a point $(t^2, 2t)$ on the parabola $y^2 = 4x$ is same as normal drawn at $(\sqrt{5}\cos\alpha, 2\sin\alpha)$ on the ellipse $\frac{x^2}{5} + \frac{y^2}{4} = 1$, then which of following is not true ?

A. $t = \pm \frac{1}{\sqrt{5}}$

B. $\alpha = -\tan^{-1} 2$

C. $\alpha = \tan^{-1} 2$

D. none

Answer: D

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8. If one end of a focal chord of the parabola $y^2 = 4ax$ be $\left(at^2, 2at\right)$, then the coordinates of its other end is

A. $\left(\frac{a}{t^2}, \frac{-2a}{t}\right)$

B. $\left(\frac{-a}{t}, \frac{2a}{t}\right)$

C. $\left(\frac{-1}{t^2}, \frac{a}{t}\right)$

D. $\left(\frac{-a}{t}, \frac{1}{t^2}\right)$

Answer: A

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9. if the tangent to the parabola $y = x(2 - x)$ at the point (1,1) intersects the parabola at P. find the co-ordinate of P.

A. (1,2)

B. (1,1)

C. (3,-2)

D. (-1,-4)

Answer: B

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10. If a circle cuts a rectangular hyperbola xy=1 in four points P,Q,R,S and the parameters of these four points be t_1, t_2, t_3 and t_4 respectively and $-20t_1t_2t_3t_4 = k$, then value of k equals

A. 1

B. -1

C. -4

D. none

Answer: D

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11. For the curve $7x^2 - 2y^2 + 12xy - 2x + 14y - 22 = 0$, which of the following is true ?

A. an hyperbola with eccentricity $\sqrt{3}$

B. an hyperbola with directrix

$$2x + y - 1 = 0$$

C. an hyperbola with focus $(1, 2)$

D. All of these

Answer: D

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12. The angle between the tangents drawn from the point $(1, 4)$ to the parabola $y^2 = 4x$ is

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

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

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

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

Answer: C

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13. The normals at three points P, Q, R of the parabola $y^2 = 4ax$ meet in (h, k) The centroid

of triangle PQR lies on (A)x=0(B)y=0(C)x=-a

(D)y=a`

A. x=0

B. y=0

C. x=-a

D. y=a

Answer: B

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14. The set of a points on the axis of the parabola $y^2 - 4x - 4y + 12 = 0$ from which all three normals to the parabola are real is

A. $(k, 2), k > 4$

B. $(k, 0), k > 5$

C. $(k, 1), k > 4$

D. none

Answer: A

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15. If for a conic section a focus is (-1,1), eccentricity=3 and the equation of the corresponding directrix is x-y+3=0, then the equation of this conic section is

A. $7x^2 - 18xy + 7y^2 + 50x - 50y + 77 = 0$

B. $7x^2 + 18xy + 7y^2 = 1$

C. $7x^2 + 18xy + 7y^2 - 50x + 50y + 77 = 0$

D. none

Answer: A

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Wb Jee Workout Category 3 One Or More Than One Option Correct Type

1. For hyperbola xy=4, which of the following is not true ?

A. Equations of transverse axis is $y \pm x = 0$

B. Eccentricity, $e = \sqrt{2}$

C. Co-ordinates of foci are $\left(2\sqrt{2}, 2\sqrt{2}\right)$ and $\left(-2\sqrt{2}, -2\sqrt{2}\right)$ and equation of directrix is given by $x + y \pm 2\sqrt{2} = 0$

D. none

Answer: D

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2. For what value of λ, the line y=2x+λ touches the hyperbola $9x^2 - 5y^2 = 45$?

A. $\sqrt{11}$

B. 11

C. -11

D. $-\sqrt{11}$

Answer: A::D

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3. The ratio of the areas of a triangle formed with vertices $A\left(at_1^2, 2at_1\right), B\left(at_2^2, 2at_2\right), C\left(at_3^2, 2at_3\right)$ lies on the parabola $y^2 = 4ax$ and triangle formed by the tangents at A,B,C is

A. $1:2$

B. $2:1$

C. $2:3$

D. $3:2$

Answer: B

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4. Length of common tangents to the hyperbolas $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ and $\frac{y^2}{a^2}-\frac{x^2}{b^2}=1$ is

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

B. $x - y = \sqrt{a^2 - b^2}$

C. $x + y = -\sqrt{a^2 - b^2}$

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

Answer: A::B::C::D

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5. Let P be the point on the parabola $y^2 = 4x$ which is at the shortest distance from the centre S of the circle $x^2 + y^2 - 4x - 16y + 64 = 0$. Let

Q be the point on the circle dividing the lie segment SP internally. Then

A. $SP = 2\sqrt{5}$

B. $SQ : QP = \left(\sqrt{5} + 1\right) : 2$

C. the x-intercept of the normal to the parabola at P is 2

D. the slope of the tangent to the circle at Q is $\frac{1}{2}$

Answer: A::D

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6. The equation $\frac{x^2}{14-a}+\frac{y^2}{9-a}=1$ represent

A. an ellipse if $a<9$

B. a hyperbola ifi $9<a<14$

C. a hyperbola if $a>14$

D. an ellipse $a>9$

Answer: A::B

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7. The point on the parabola $y^2 = 4x$ at which it cuts the straight line joining (0,0) and (2,3) is

A. (0,0)

B. (2,3)

C. (16/9,8/3)

D. (1,2)

Answer: A::C

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8. If the line $ax + by + c = 0$ is a tangent to the curve $xy = 4$ then

A. $a < 0, b > 0$

B. $a \leq 0, b > 0$

C. $a < 0, b < 0$

D. $a \leq 0, b < 0$

Answer: C

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9. If parametric representation of a parabola is $x = 2 + t^2$ and $y = 2t + 1$, then

A. axis of parabola is y=1

B. equation of directrix is x=1

C. focus of parabola is S(3,1)

D. vertex of parabola is V(2,1)

Answer: A::B::C::D

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10. Let $x^2 + 3xy + 2y^2 + 2x + 3y = 0$ a hyperbola, then which of the follwing is true ?

A. equation of asymptotes is

$$x^2 + 3xy + 2y^2 + 2x + 3y + 1 = 0$$

B. Equations of asymptotes are

$$x + y + 1 = 0 \text{ and } x + 2y + 1 = 0$$

C. The equation of conjugate hyperbola is

$$x^2 + 3xy + 2y^2 + 2x + 3y + 2 = 0$$

D. none

Answer: A::B::C

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11. Let P and Q be distinct points on the parabola $y^2 = 2x$ such that a circle with PQ as diameter passes through the vertex O of the parabola. If P lies in the first quadrant and the area of the triangle ΔOPQ is $3\sqrt{2}$, then which of the following is (are) the coordinates of P?

A. $\left(4, 2\sqrt{2}\right)$

B. $\left(9, 3\sqrt{3}\right)$

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

D. $(1, \sqrt{2})$

Answer: A::D

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12. The locus of mid-points of a focal chord of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

A. director circle with radius $\sqrt{a^2 + b^2}$

B. $\frac{x^2}{a^2} + \frac{y^2}{b^2} - \frac{ex}{a} = 0$

C. $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{ex}{a} = 0$

D. Mutually $\perp$ tangents to the ellipse

Answer: B::C

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13. A circle S=0 touches a circle $S_1 = x^2 + y^2 - 4x + 6y - 23 = 0$ internally and the circle $S_2 = x^2 + y^2 - 4x + 8y + 19 = 0$ externally. The locus of centre S=0 is a conic whose eccentricity is e and r_1 and r_2 be the radius of

S_1 & S_2 respectively and $[\cdot]$ denotes greatest integer, then

A. $r_1 + r_2 = 7$

B. $r_1 - r_2 = 5$

C. $\left[\frac{1}{e}\right] = 7$

D. none

Answer: A::B::C

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14. Acute angle between two curve $x^2 + y^2 = a^2\sqrt{2}$ and $x^2 - y^2 = a^2$ is

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

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

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

D. $\frac{\pi}{12}$

Answer: B

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15. The eccentricity of the hypebola whose asymptotes are $5x + 12y - 7 = 0$ and $12x - 5y + 5 = 0$ is

A. $\sqrt{3}$

B. $2\sqrt{3}$

C. 2

D. none

Answer: D

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Wb Jee Previous Years Questions Category 1 Single Option Correct Type

1. Lines $x + y = 1$ and $3y = x + 3$ intersect the ellipse $x^2 + 9y^2 = 9$ at the points P,Q,R. the area of the triangles PQR is

A. $\frac{36}{5}$

B. $\frac{18}{5}$

C. $\frac{9}{5}$

D. $\frac{1}{5}$

Answer: B

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2. For the variable t, the locus of the point of intersection of the lines $3tx - 2y + 6t = 0$ and $3x + 2ty - 6 = 0$ is

A. the ellipse $\frac{x^2}{4} + \frac{y^2}{9} = 1$

B. the ellipse $\frac{x^2}{9} + \frac{y^2}{4} = 1$

C. The hyperbola $\frac{x^2}{4} - \frac{y^2}{9} = 1$

D. the hyperbola $\frac{x^2}{9} - \frac{y^2}{4} = 1$

Answer: A

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3. The locus of the midpoints of the chords of an ellipse $x^2 + 4y^2 = 4$ that are drawn from the positive end of the minor axis, is

A. a circle with centre $\left(\frac{1}{2}, 0\right)$ and radius 1

B. a parabola with focus $\left(\frac{1}{2}, 0\right)$ and directrix x=-1

C. an ellipse with centre $\left(0, \frac{1}{2}\right)$, major axis 1 and minor axis $\frac{1}{2}$

D. a hyperbola with centre $\left(0, \frac{1}{2}\right)$, transverse axis 1 and conjugate axis $\frac{1}{2}$

Answer:

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4. For the variable t, the locus of the points of intersection of lines $x - 2y = t$ and $x + 2y = \frac{1}{t}$ is

A. the straight line x=y

B. the circle with centre at the origin and radius 1

C. the ellipse with centre at the origin and one focus $\left(\frac{2}{\sqrt{5}}, 0\right)$

D. the hyperbola with centre at the origin and one focus $\left(\frac{\sqrt{5}}{2}, 0\right)$

Answer: D

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5. The line $y = x$ intersects the hyperbola $\frac{x^2}{9} - \frac{y^2}{25} = 1$ at the points P and Q. The eccentricity of ellipse with PQ axis and minor axis of length $\frac{5}{\sqrt{2}}$ is (A) $\frac{\sqrt{5}}{3}$ (B) $\frac{5}{\sqrt{3}}$ (C) $\frac{2\left(\sqrt{2}\right)}{3}$ (D) $\frac{3}{\sqrt{2}}$

A. $\frac{\sqrt{5}}{3}$

B. $\frac{5}{\sqrt{3}}$

C. $\frac{5}{9}$

D. $\frac{25}{9}$

Answer:

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6. If the distance between the foci of an ellipse is half the length of its latus rectum,then the eccentricity of the ellipse is

A. $\frac{1}{4}(\sqrt{5}-1)$

B. $\frac{1}{2}(\sqrt{5}+1)$

C. $\frac{1}{2}(\sqrt{5}-1)$

D. $\frac{1}{4}(\sqrt{5}+1)$

Answer: C

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7. If P be a point on the parabola $y^2 = 4ax$ with focus F. Let Q denote the foot of the perpendicular from P onto the directrix. Then, $\frac{\tan\angle PQF}{\tan\angle PFQ}$ is

A. 1

B. $1/2$

C. 2

D. $1/4$

Answer: A

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8. if $y = 4x + 3$ is parallel to a tangent to the parabola $y^2 = 12x$, then its distance from the normal parallel to the given line is

A. $\frac{213}{\sqrt{17}}$

B. $\frac{219}{\sqrt{17}}$

C. $\frac{211}{\sqrt{17}}$

D. $\frac{210}{\sqrt{17}}$

Answer: B

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9. The point on the parabola $y^2 = 64x$ which is nearest to the line $4x + 3y + 35 = 0$has coordinates

A. (9,-24)

B. (1,81)

C. (4,-16)

D. (-9,-24)

Answer: A

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10. The value of λ for which the curve $(7x+5)^2+(7y+3)^2=\lambda^2(4x+3y-24)^2$ represents a parabola is

A. $\pm\frac{6}{5}$

B. $\pm\frac{7}{5}$

C. $\pm\frac{1}{5}$

D. $\pm\frac{2}{5}$

Answer: B

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11. The equation of the common tangent with positive slope to the parabola $y^2 = 8\sqrt{3}x$ and hyperbola $4x^2 - y^2 = 4$ is

A. $y = \sqrt{6}x + \sqrt{2}$

B. $y = \sqrt{6}x - \sqrt{2}$

C. $y = \sqrt{3}x + \sqrt{2}$

D. $y = \sqrt{3}x - \sqrt{2}$

Answer: A

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12. The the vertex of the conic $y^2 - 4y = 4x - 4a$ always lies between the straight lines $x + y = 3$ and $2x + 2y - 1 = 0$ then

A. $2 < a < 4$

B. $-\frac{1}{2} < a < 2$

C. $0 < a < 2$

D. $-\frac{1}{2} < a < \frac{3}{2}$

Answer: B

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13. Number of intersecting points of the coincs $4x^2 + 9y^2 = 1$ and $4x^2 + y^2 = 4$ is

A. 1

B. 2

C. 3

D. 0

Answer: D

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14. Then equation of auxiliary circle of the ellipse $16x^2 + 25y^2 + 32x - 100y = 284$ is (A)

$x^2 + y^2 + 2x - 4y - 20 = 0$ (B)

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

$(x+1)^2 + (y-2)^2 = 400$ (D)

$(x+1)^2 + (y-2)^2 = 225$

A. $x^2 + y^2 + 2x - 4y - 20 = 0$

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

C. $(x+1)^2 + (y-2)^2 = 400$

D. $(x+1)^2 + (y-2)^2 = 225$

Answer: A

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15. If PQ is a double ordinate of the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ such that OPQ is an equilateral triangle, O being the center of the hyperbola,

then find the range of the eccentricity e of the hyperbola.

A. $1 < e < \frac{2}{\sqrt{3}}$

B. $e = \frac{2}{\sqrt{2}}$

C. $e = \frac{\sqrt{3}}{2}$

D. $e > \frac{2}{\sqrt{3}}$

Answer: D

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16. The line $y = x + \lambda$ is a tangent to an ellipse $2x^2 + 3y^2 = 1$ then

A. -2

B. 1

C. $\sqrt{\frac{5}{6}}$

D. $\sqrt{\frac{2}{3}}$

Answer: C

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17. The locus of the point of intersection of the straight lines $\frac{x}{a}+\frac{y}{b}=k$ and $\frac{x}{a}-\frac{y}{b}=\frac{1}{k}$, where k is a non-zero real variable, is given by

A. a straight line

B. an ellipse

C. a parabola

D. a hyperbola

Answer: D

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18. Let P be the foot of the perpendicular from focus S of hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ on the line $bx - ay = 0$ and let C he the centre of the hyperbola. Then the area of the rectangle whose sides are equal to that of SP and CP is

A. 2ab

B. ab

C. $\frac{\left(a^2 + b^2\right)}{2}$

D. $\frac{a}{b}$

Answer: B

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19. B is extermity of the minor axis of an elipse whose foci are S and S'. If $\angle SBS'$ is a right angle, then the eccfentricity of the ellipse is

A. $\frac{1}{2}$

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

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

D. $\frac{1}{3}$

Answer: B

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20. The axis of the parabola $x^2 + 2xy + y^2 - 5x + 5y - 5 = 0$ is

A. $x + y = 0$

B. $x + y - 1 = 0$

C. $x - y + 1 = 0$

D. $x - y = \frac{1}{\sqrt{2}}$

Answer: A

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21. The line segment joining the foci of the hyperbola $x^2-y^2+1=0$ is one of thediameters of a circle. The equation of the circle is

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

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

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

D. $x^2+y^2=2\sqrt{2}$

Answer: C

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22. The focus of the conic $x^2 - 6x + 4y + 1 = 0$ is

A. (2,3)

B. (3,2)

C. (3,1)

D. (1,4)

Answer: C

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23. Equation of common tangent of $y = x^2, y = -x^2 + 4x - 4$ is

A. 1

B. 2

C. 3

D. 4

Answer: B

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24. Let the eccentricity of the hyperbola $\frac{x^2}{a^2} - \frac{y^3}{b^2} = 1$ be reciprocal to that of the ellipse $x^2 + 9y^2 = 9$, then the ratio $a^2 : b^2$ equals

A. $8:1$

B. $1:8$

C. $9:1$

D. $1:9$

Answer: A

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25. Let a, r, s, t be non-zero real numbers. Let $P(at^2, 2at), Q(ar^2, 2ar)$ and $S(as^2, 2as)$ be distinct points on the parabola $y^2 = 4ax$. Suppose that PQ is the focal chord and lines QR and PK are parallel, where K the point (2a,0).

If st=1, then the tangent at P and the normal at S to the parabola meet at a point whose ordinate is

A. $\frac{t}{1-t^2}$

B. $\frac{1-t^2}{t}$

C. $\frac{t^2+1}{t}$

D. $\frac{t^2-1}{t}$

Answer: D

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26. Let P be a point on the ellipse $\frac{x^2}{9}+\frac{y^2}{4}=1$ and the line through P parallel to the y-axis meets the circle $x^2+y^2=9$ at Q where P,Q are on the same side of the x-axis. If R is a point on PQ such that $\frac{PR}{RQ}=\frac{1}{2}$, then locus of R is

A. $\frac{x^2}{9} + \frac{9y^2}{49} = 1$

B. $\frac{x^2}{49} + \frac{y^2}{9} = 1$

C. $\frac{x^2}{9} + \frac{y^2}{49} = 1$

D. $\frac{9x^2}{49} + \frac{y^2}{49} = 1$

Answer: A

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27. Let P(4,3) be a point on the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$. If the normal at P intersects the

x-axis at (16,0), then the eccentricity of the hyperbola is

A. $\frac{\sqrt{5}}{2}$

B. 2

C. $\sqrt{2}$

D. $\sqrt{3}$

Answer: B

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28. For the hyperbola $\frac{x^2}{\cos^2\alpha} - \frac{y^2}{\sin^2\alpha} = 1$`; (0

A. directrix

B. vertices

C. foci

D. eccentricity

Answer: C

29. S and T are foci of an ellipse and B is an end of the minor axis , if STB is an equilateral triangle , the eccentricity of the ellipse , is

A. $\frac{1}{4}$

B. $\frac{1}{3}$

C. $\frac{1}{2}$

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

Answer: C

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30. The equation of th directrices of the hyperbola $3x^2 - 3y^2 - 18x + 12y + 2 = 0$ is

A. $x = 3 \pm \sqrt{\frac{13}{6}}$

B. $x = 3 \pm \sqrt{\frac{6}{13}}$

C. $x = 6 \pm \sqrt{\frac{13}{3}}$

D. $x = 6 \pm \sqrt{\frac{3}{13}}$

Answer: A

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31. P is the extremity of the latuscrectum of ellipse $3x^2 + 4y^2 = 48$ in the first quadrant. The eccentric angle of P is

A. $\frac{\pi}{8}$

B. $\frac{3\pi}{4}$

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

D. $\frac{2\pi}{3}$

Answer: C

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32. The length of conjugate axis of a hyperbola is greater than the length of transverse axis. Then the eccentricity e is

A. $= \sqrt{2}$

B. $> \sqrt{2}$

C. $< \sqrt{2}$

D. $< \frac{1}{\sqrt{2}}$

Answer: B

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Wb Jee Previous Years Questions Category 2 Single Option Correct Type

1. A line passing through the point of intersection of $x + y = 4$ and $x - y = 2$ makes an angle $\tan^{-1}\left(\frac{3}{4}\right)$ with the x-axis. It intersect the parabola $y^2 = 4(x - 3)$ at points (x_1, y_1) and (x_2, y_2) respectively. Then,$|x_1 - x_2|$ is equal to

A. $\frac{16}{9}$

B. $\frac{32}{9}$

C. $\frac{40}{9}$

D. $\frac{80}{9}$

Answer: B

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2. The equation of hyperbola whose coordinates of the foci are $(\pm 8, 0)$ and the length of the latus rectum is 24 units. Is

A. $3x^2 - y^2 = 48$

B. $4x^2 - y^2 = 48$

C. $x^2 - 3y^2 = 48$

D. $x^2 - 4y^2 = 48$

Answer: A

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3. The locus of the midpoints of all chords of the parabola $y^2 = 4ax$ through its vertex is another parabola with directix

A. x=-a

B. x=a

C. x=0

D. $x = -\frac{a}{2}$

Answer: D

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4. Tangents are drawn to the ellipse $\frac{x^2}{9}+\frac{y^2}{5}=1$ at the end of latus rectum. Find the area of quadrilateral so formed

A. 27 sq. units

B. $\frac{13}{2}$ sq. units

C. $\frac{15}{4}$ sq. units

D. 45 sq. units

Answer: A

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5. Consider the parabola $y^2 = 4x$, let P and Q be two points $(4, -4)$ and $(9, 6)$ on the parabola. Let R be a moving point on the arc of the parabola whose x-coordinate is between P and Q. If the maximum area of triangle PQR is K, then $(4K)^{1/3}$ is equal to

A. $\angle PQR = 90^\circ$

B. $R(4, 4)$

C. $R\left(\frac{1}{4}, 1\right)$

D. $R\left(1, \frac{1}{4}\right)$

Answer: C

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Wb Jee Previous Years Questions Category 3 One Or More Than One Option Correct Type

1. The equation

$$16x^2 - 3y^2 - 3y^2 - 32x + 12y - 44 = 0$$

represents a hyperbola. the length of whose

transvers axis is $4\sqrt{3}$ the length of whose transvers axis is 4 whose center is $(-1, 2)$ whose eccentricity is $\sqrt{\frac{19}{3}}$

A. length of the transverse axis is $2\sqrt{3}$

B. length of each latus rectum is $32/\sqrt{3}$

C. eccentricity is $\sqrt{19/3}$

D. equation of a directrix is $x = \frac{\sqrt{19}}{3}$

Answer: A::B::C

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2. If the parabola $x^2 = ay$ makes an intercept of length $\sqrt{40}$ unit on the line $y - 2x = 1$ then a is equal to

A. 1

B. -2

C. -1

D. 2

Answer: A::B

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3. On the ellipse $4x^2 + 9y^2 = 1$, the points at which the tangents are parallel to the line $8x = 9y$ are $\left(\frac{2}{5}, \frac{1}{5}\right)$ (b) $\left(-\frac{2}{5}, \frac{1}{5}\right)$ $\left(-\frac{2}{5}, -\frac{1}{5}\right)$ (d) $\left(\frac{2}{5}, -\frac{1}{5}\right)$

A. $\left(\frac{2}{5}, \frac{1}{5}\right)$

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

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

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

Answer: B::D

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4. A hyperbola, having the transverse axis of length $2\sin\theta$, is confocal with the ellipse $3x^2 + 4y^2 = 12$. Then its equation is

A. $x^2\sin^2\theta - y^2\cos^2\theta = 1$

B. $x^2\text{cosec}^2\theta - y^2\sec^2\theta = 1$

C. $\left(x^2 + y^2\right)\sin^2\theta = 1 + y^2$

D. $x^2\text{cosec}^2\theta = x^2 + y^2 + \sin^2\theta$

Answer: B

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5. Let A and B be two distinct points on the parabola $y^2 = 4x$. If the axis of the parabola touches a circle of radius r having AB as its diameter, then the slope of the line joining A and B can be

A. $-\frac{1}{r}$

B. $\frac{1}{r}$

C. $\frac{2}{r}$

D. $-\frac{2}{r}$

Answer: C::D

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6. Equation ofa tangent passing through (2, 8) to the hyperbola $5x^2 - y^2 = 5$ is

A. $3x - y + 2 = 0$

B. $3x + y - 14 = 0$

C. $23x - 3y - 22 = 0$

D. $3x - 23y + 178 = 0$

Answer: A::C

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