PARABOLA
CONIC SECTION

SYNOPSIS

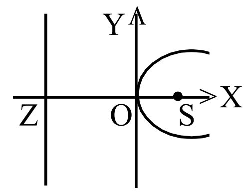
- **CONIC:** The set of points in a plane whose distances from a fixed point (focus) and a fixed straight line (directrix) are in a constant ratio 'e' is called a conic.
  The constant ratio 'e' is called the eccentricity of the conic. The conic is known as Parabola, Ellipse, Hyperbola according as the value of e is equal to 1, less than 1, greater than 1 respectively.
- Equation of a conic with (x_1, y_1) focus $lx+my+n=0$ directrix and eccentricity e is
  $\left(l^2+m^2\right)\left[\left(x-x_1\right)^2+\left(y-y_1\right)^2\right]=e^2\left(lx+my+n\right)^2$.
- The general equation of a conic is of the form $ax^2+2hxy+by^2+2gx+2fy+c=0$.
- **AXIS OF A CONIC:** The line which is perpendicular to directrix and passing through the focus is called the axis.
- **VERTICES:** The points of intersection of the conic and its axis are called the vertices of the conic.
- **CENTRE:** The point c is called the centre of the conic, if every chord of the conic passing through c is bisected at c.
- **FOCAL CHORD:** Any chord of the conic through the focus is called a focal chord.
- **DOUBLE ORDINATE:** A chord of a conic perpendicular to axis.
- **LATUSRECTUM:** A focal chord of a conic perpendicular to its axis is called the latusrectum.
- **FOCAL DISTANCE:** The distance from focus to any point on a conic is called focal distance.
- For any conic, if semilatusrectum is l and the perpendicular from the focus to directrix is d then $\frac{l}{d}=e$

PARABOLA

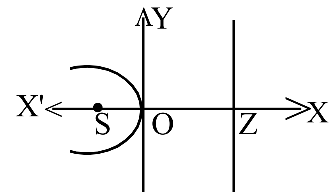
- **DEFINITION:** A parabola is the locus of a point which moves such that its distance from a fixed point is always equal to its distance from a fixed straight line.
- When $\Delta \neq 0$ and $h^2=ab$ the equation $ax^2+2hxy+by^2+2gx+2fy+c=0$ represents a parabola.
- The standard equation of a parabola is $y^2=4ax$.

- **FOUR TYPES OF PARABOLAS:**

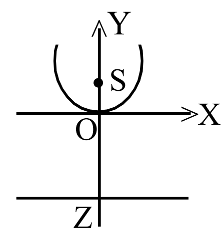
$y^2=4ax$



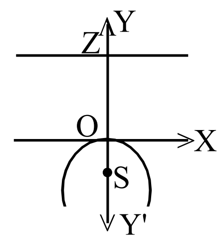
$y^2=-4ax$



$x^2=4ay$



$x^2=-4ay$



Parabola	y^2=4ax	y^2=-4ax	x^2=4ay	x^2=-4ay
Vertex	(0, 0)	(0, 0)	(0, 0)	(0, 0)
Focus	(a, 0)	(-a, 0)	(0, a)	(0, -a)
Directrix	x+a=0	x-a=0	y+a=0	y-a=0
Eqa. of L.R.	x-a=0	x+a=0	y-a=0	y+a=0
Tangent at the vertex	x=0	x=0	y=0	y=0
Eqa. of Axis	y=0	y=0	x=0	x=0
Lenth of the L.R.	4a	4a	4a	4a
Ends of L.R	$(a,\pm 2a)$	$(-a,\pm 2a)$	$(\pm 2a,a)$	$(\pm 2a,-a)$

NOTE: Origin is vertex and 4a is length of latusrectum for all these four parabolas.

- If $P(x_1,y_1)$ is a point on $y^2=4ax$ the focal distance of p is x_1+a.
  If $P(x_1,y_1)$ is a point on $x^2=4ay$ the focal distance of P is y_1+a.

EQUATIONS OF PARABOLAS:

- The equation $(y-k)^2=4a(x-h)$ represents a parabola with axis $y-k=0$, vertex (h, k), focus $(h+a,k)$, directrix $x=h-a$ and length of latusrectum 4a.

- The equation $(x-h)^2 = 4a(y-k)$ represents a parabola with axis $x-h=0$, vertex (h, k), focus (h, k+a), directrix $y=k-a$ and length of latusrectum 4a.
- If the axis is parallel to x axis then the equation of the parabola is of the form $x=ay^2+by+c$ or $y^2+Dy+Ex+F=0$.
- If the axis is parallel to y axis then the equation of the parabola is of the form $y=ax^2+bx+c$ or $x^2+Dx+Ey+F=0$.
- **NOTATIONS:** $S=y^2-4ax$

  $S_1 = yy_1 - 2a(x+x_1)$

  $S_{12} = y_1y_2 - 2a(x_1+x_2)$

  $S_{11} = y_1^2 - 4ax_1$
- The point (x_1, y_1) lies inside or on or outside the parabola S=0 according as $S_{11} \begin{smallmatrix} < \\ = \\ > \end{smallmatrix} 0$.

TANGENT, NORMAL, CONDITIONS OF TANGENCY:

- Equation of the tangent to $y^2=4ax$ at (x_1,y_1) is $yy_1 = 2a(x+x_1)$.
- Equation of the normal to $y^2=4ax$ at (x_1,y_1) is $y-y_1 = \frac{-y_1}{2a}(x-x_1)$.
- • The condition for $lx+my+n=0$ to touch $y^2=4ax$ is $am^2=ln$ and the point of contact is $\left(\frac{n}{l}, \frac{-2am}{l}\right)$

  • The condition for $lx+my+n=0$ to touch $x^2=4ay$ is $al^2=mn$ and the point of contact is $\left(\frac{-2al}{m}, \frac{n}{m}\right)$
- The condition for $lx+my+n=0$ to be a normal to $y^2=4ax$ is $al^3+2alm^2+m^2n=0$.
- The condition for the line $y=mx+c$ to touch $y^2=4ax$ is $c=\frac{a}{m}$ and the point of contact is $\left(\frac{a}{m^2}, \frac{2a}{m}\right)$.
- Equation of the tangent to $y^2=4ax$ having slope m is $y=mx+\frac{a}{m}$.
- Equation of the tangent to $y^2=4a(x+a)$ having slope m is $y=m(x+a)+\frac{a}{m}$.
- i) Equation of the normal to $y^2=4ax$ having slope m is $y=mx-2am-am^3$ and the foot of the normal is $(am^2, -2am)$.

  ii) $y=mx+c$ is a normal to the parabola $y^2=4ax$ then $c=-2am-am^3$
- The condition for y=mx+c to touch $x^2=4ay$ is $c=-am^2$.
- Equation of common tangent to the parabolas $y^2=4ax$ and $x^2=4by$ is $xa^{\frac{1}{3}}+yb^{\frac{1}{3}}+a^{\frac{2}{3}}b^{\frac{2}{3}}=0$.

POINT ON PARABOLA:

- The equations $x=at^2, y=2at$ are called the parametric equations of the parabola $y^2=4ax$. The point on $y^2=4ax$ is taken as $(at^2, 2at)$ and this is denoted by $p(t)$ point.
- Equation of the chord joining t_1 and t_2 on $y^2=4ax$ is $y(t_1+t_2)=2(x+at_1t_2)$
- If t_1 and t_2 are the extremities of a focal chord of a parabola then $t_1t_2=-1$.
- Equation of the tangent to $y^2=4ax$ at the point 't' is $yt=x+at^2$.
- Equation of the normal to $y^2=4ax$ at the point 't' is $tx+y=2at+at^3$., $\sum t_1 = 0,$

  $\sum t_1t_2 = \frac{2a-x_1}{a}$, $t_1t_2t_3 = \frac{y_1}{a}$
- Slope of the tangent and normal at the point 't' to $y^2=4ax$ are $\frac{1}{t}, -t$.
- The point of intersection of the tangents at t_1, t_2 on

the parabola $y^2 = 4ax$ is $\left[at_1t_2, a(t_1+t_2)\right]$.

- The point of intersection of normals drawn at t_1 and t_2 to $y^2 = 4ax$ is $\left[2a + a\left\{(t_1+t_2)^2 - t_1t_2\right\}, -at_1t_2(t_1+t_2)\right]$.
- If the normal at $\left(at_1^2, 2at_1\right)$ cuts the parabola again at $\left(at_2^2, 2at_2\right)$ then $t_2 = -t_1 - \frac{2}{t_1}$.
- If the normals at the points t_1 and t_2 on the parabola intersect on the parabola at t_3 then (1) $t_1t_2 = 2$, (2) $t_1 + t_2 = -t_3$.
- The tangents at the ends of a focal chord of the parabola meet on the directrix at right angles.
- The tangent at one end of a focal chord of a parabola is parallel to the normal at the other end.
- If $\left(at^2, 2at\right)$ is one end of a focal chord of the parabola then the other end is $\left(\frac{a}{t^2}, \frac{-2a}{t}\right)$.
- The length of the focal chord at t is $a\left(t + \frac{1}{t}\right)^2$.
- If PSQ is a focal chord of the parabola $y^2 = 4ax$ with focus S then $\frac{1}{SP} + \frac{1}{SQ} = \frac{1}{a}$.
- The least length of a focal chord of a parabola is its length of latusrectum.
- Length of the focal chord of $y^2 = 4ax$ making an angle θ with its axis is $4a\operatorname{cosec}^2\theta$.
- Length of the chord of the parabola $y^2 = 4ax$ passing through the vertex and making an angle θ with its axis is $4a\cos\theta\operatorname{cosec}^2\theta$.
- If $(x_1, y_1), (x_2, y_2)$ are the extremities of a focal chord of the parabola $y^2 = 4ax$ then (1) $x_1x_2 = a^2$, (2) $y_1y_2 = -4a^2$.
- The orthocentre of the triangle formed by the tangents at t_1, t_2, t_3 to the parabola $y^2 = 4ax$ is $\left[-a, a\left(t_1 + t_2 + t_3 + t_1t_2t_3\right)\right]$.
- Orthocentre of the triangle formed by any three tangents to the parabola lies on the directrix of the parabola.

CHORD OF CONTACT:

- Equation of the chord of contact of (x_1, y_1) with respect to $y^2 = 4ax$ is $yy_1 = 2a(x + x_1)$.
- Area of the triangle formed by the tangents from (x_1, y_1) to the parabola $y^2 = 4ax$ and its chord of contact is $\frac{\left(y_1^2 - 4ax_1\right)^{\frac{3}{2}}}{2a}$.
- The length of chord of contact of tangents drawn from (x_1, y_1) to the parabola $y^2 = 4ax$ is $\frac{\sqrt{\left(y_1^2 - 4ax_1\right)\left(y_1^2 + 4a^2\right)}}{a}$.

STANDARD RESULTS:

- The locus of the foot of the perpendicular from the focus to the tangent of a parabola is the tangent at the vertex.
- The circle drawn on focal chord of a parabola as diameter touches the directrix.
- The circle drawn on focal radius of a parabola as diameter touches the tangent at the vertex.

SLOPE, ANGLE BETWEEN THE TANGENTS DRAWN FROM AN EXTERNAL POINT:

- From an external point two tangents can be drawn to a parabola. The slopes of the two tangents to $y^2 = 4ax$ passing through (x_1, y_1) are given by the equation $m^2x_1 - my_1 + a = 0$.
- If m_1, m_2 be the slopes of the two tangents drawn from (x_1, y_1) to $y^2 = 4ax$ then $m_1 + m_2 = \frac{y_1}{x_1}$, $m_1m_2 = \frac{a}{x_1}$.
- If θ is the angle between the pair of tangents drawn from (x_1, y_1) to $y^2 = 4ax$ then $\tan\theta = \frac{\sqrt{y_1^2 - 4ax_1}}{x_1 + a}$ or $\frac{\sqrt{S_{11}}}{x_1 + a}$.
- The locus of point of intersection of the two tangents to $y^2 = 4ax$ included at a constant angle α is $(x+a)^2\tan^2\alpha = y^2 - 4ax$.
- Locus of point of intersection of perpendicular tangents to a parabola is its directrix.

NORMALS:

- From a point which lies inside the parabola three normals can be drawn to the parabola. The sum of the ordinates of the feet of the three normals is zero.
- The centroid of the triangle formed by the feet of the three normals of the parabola lies on the axis of the parabola.

POLE-POLAR:

- Polar of (x_1, y_1) w.r.to the parabola $y^2 = 4ax$ is $yy_1 = 2a(x + x_1)$.
- Pole of the line $lx + my + n = 0$ w.r.to $y^2 = 4ax$ is $\left(\frac{n}{l}, \frac{-2am}{l}\right)$.
- The condition for $l_1x + m_1y + n_1 = 0$, $l_2x + m_2y + n_2 = 0$ to be conjugate lines w.r.to $y^2 = 4ax$ is $l_1n_2 + l_2n_1 = 2am_1m_2$.
- i) If a line $lx + my + n = 0$ intersect the parabola $y^2 = 4ax$ in the points A and B then the point of intersection of the tangents at A and B is $\left(\frac{n}{l}, \frac{-2am}{l}\right)$.
  ii) Pole of line $lx + my + n = 0$ w.r. to parabola $x^2 = 4ay$ is $\left(\frac{-2al}{m}, \frac{n}{m}\right)$
- The polar of the focus of a parabola w.r.to the parabola is its directrix.
- The pole of the directrix of a parabola w.r.to the parabola is its focus.
- The locus of poles of focal chords of a parabola is its directrix.
- The polar of any point on the directrix of a parabola w.r.to the parabola passes through its focus.

CHORD WITH MID POINT:

- If the lines y=mx+c intersect the parabola $y^2 = 4ax$ in the points A and B then:
  (1) The length of the chord AB is $\frac{4}{m^2}\sqrt{a(a - mc)(1 + m^2)}$
  (2) The mid point of the chord AB is $\left(\frac{2a - mc}{m^2}, \frac{2a}{m}\right)$.
- Equation of the chord of the parabola $y^2 = 4ax$ with mid point (x_1, y_1) is $yy_1 - 2ax = y_1^2 - 2ax_1$.
- Locus of mid points of a system of parallel chords of a parabola is a straight line parallel to the axis of the parabola.

STANDARD RESULTS:

- The length of sub tangent at any point $P(x_1, y_1)$ on $y^2 = 4ax$ is $2x_1$.
- The length of sub normal at any point on a parabola is constant and is equal to semilatusrectum.
- The semilatusrectum of a parabola is the harmonic mean between the segments of a focal chord.
- P is a point on the parabola $y^2 = 4ax$ with focus S. If the tangent and normal at P meets the axis at T and N then ST=SP=SN.
- The ordinate of the point of intersection of the two tangents to a parabola is the arithmetic mean between the ordinates of the points of contact.
- Area of triangle inscribed in parabola $y^2 = 4ax$ is $\frac{1}{8a}\left|(y_1 - y_2)(y_2 - y_3)(y_3 - y_1)\right|$ where y_1, y_2 & y_3 are ordinates of angular points.

CONCEPTUAL QUESTIONS

1. The point on the parabola which is nearest to directrix is
   1) End of latusrectum 2) Focus
   3) Vertex 4) Centre.
2. Number of focal chords of the parabola $y^2 = 9x$ whose length is less than 9 is
   1) 2 2) 5 3) 1 4) 0
3. The locus of the centre of a circle passing through a point and touching a line is
   1) a straight line 2) an ellipse
   3) a parabola 4) a hyperbola
4. Locus of the point equidistant from (0, -1) and the line y=1 is
   1) a parabola with vertex (0, 0)
   2) a parabola with focus (0, 1)
   3) a parabola with directrix y=-1
   4) a parabola with axis y=0
5. The foci of the parabolas $y^2 = 4x$, $x^2 = 4y$, $y^2 + 4x = 0, x^2 + 4y = 0$ taken in order are the vertices of a
   1) rectangle 2) parallelogram
   3) rhombus 4) square
6. When a circle with centre lying on the focus of a parabola touches its directrix then the radius of the circle is
   1) $\frac{1}{4}$ (length of latusrectum of the parabola)

2) $\frac{1}{2}$ (length of latusrectum of the parabola)

3) $\frac{3}{4}$ (length of latusrectum of the parabola)

4) $\frac{2}{3}$ (length of latusrectum of the parabola)

7. If the normal at t_1 and t_2 on the parabola $y^2 = 4ax$ meet again on parabola then $t_1t_2 =$
a) 1 2) 2 3) 3 4) 4

8. If the normal chord at 't' on $y^2 = 4ax$ subtends a right angle at vertex then $t^2 =$
1) 0 2) 1 3) 2 4) 3

9. If the normal at "t" on $y^2 = 4ax$ subtends a right angle at focus then $t^2 =$
1) 1 2) 2 3) 3 4) 4

10. Locus of the foot of the perpendicular from focus on any tangent to a parabola is
1) axis 2) directrix
3) tangent at the vertex
4) latus rectum

KEY

1. 3	2. 4	3. 3	4. 1	5. 4
6. 2	7. 2	8. 3	9. 4	10.3

LEVEL-1

1. Equation of a parabola whose focus is (1, 2) and directrix x + 1 = 0 is
1) $y^2 - 4y - 4x + 4 = 0$ 2) $y^2 - 2y - 4x + 8 = 0$
3) $y^2 - 2y - 6x + 9 = 0$ 4) $y^2 - 2y + 4x - 8 = 0$

2. Equation of the parabola with focus (0, -2) and directrix y-2=0 is
1) $y^2 = 8x$ 2) $y^2 = -12x$
3) $x^2 = 4y$ 4) $x^2 = -8y$

3. Equation of the parabola with focus (3, -4) and directrix x + y + 7 = 0 is
1) $x^2 + y^2 - 2xy - 26x + 2y + 1 = 0$
2) $x^2 + y^2 - 2xy - 26x + 14y - 3 = 0$
3) $x^2 + y^2 - 2xy - 26x - 14y + 3 = 0$
4) $x^2 + y^2 - 2xy - 26x - 2y + 5 = 0$

4. The focus and vertex of a parabola are (4, 5) and (3, 6). The equation of axis is
1) 2x-y+3=0 2) 2x-y=0
3) 2x+y-13=0 4) x+y-9=0

5. The vertex and focus of a parabola are (0, 0) and (0, 4) then its directrix is
1) y+8=0 2) y+6=0 3) y+5=0 4) y+4=0

6. The focus and directrix of a parabola are (0, 0) and y=2x+1. The equation of its axis is
1) 2x-y=0 2) x+2y=0
3) x+2y=5 4) x+2y-7=0

7. The vertex and focus of a parabola are (-2, 2), (-6, 6). Then its length of latusrectum is
1) $8\sqrt{2}$ 2) $4\sqrt{2}$ 3) $16\sqrt{2}$ 4) $12\sqrt{2}$

8. If the vertex and focus of a parabola are (3, 6) and (4, 5) then the equation of its directrix is
1) x-y+7=0 2) x-y+9=0
3) x-y+5=0 4) x-y+3=0

9. If the focus and directrix of a parabola are (3,-4) and x+y+7=0 then its length of latusrectum is
1) $3\sqrt{2}$ 2) $8\sqrt{2}$ 3) $10\sqrt{2}$ 4) $6\sqrt{2}$

10. The vertex and focus of a parabola are (2, 1), (1, -1). Then the equation of the tangent at the vertex is
1) x+2y-6=0 2) x+2y-4=0
3) x+2y-9=0 4) x+2y-7=0

11. The focus and directrix of a parabola are (1, 2) and 2x-3y+1=0. Then the equation of the tangent at the vertex is
1) 4x-6y+5=0 2) 4x-6y+9=0
3) 4x-6y+11=0 4) 4x-6y+7=0

12. The focus and directrix of a parabola are (1, -1) and x+y+3=0. Its vertex is
1) $\left(\frac{7}{4}, \frac{1}{4}\right)$ 2) $\left(\frac{1}{2}, \frac{-7}{4}\right)$ 3) $\left(\frac{1}{4}, \frac{-7}{4}\right)$ 4) $\left(\frac{1}{2}, \frac{5}{2}\right)$

13. Equation of the parabola whose vertex is the origin, axis along the x axis and which passes through the point (-2, 4) is
1) $y^2 = -8x$ 2) $y^2 = -12x$
3) $y^2 = 8x$ 4) $x^2 = y$

14. Equation of the parabola whose vertex is the origin, axis along the y axis and which passes through (4, 2) is
1) $x^2 = 8y$ 2) $x^2 + 8y = 0$
3) $y^2 = x$ 4) $y^2 + x = 0$

15. Equation of a parabola whose vertex is (2, -3), axis is parallel to the x axis and latusrectum 8 is
1) $(y+3)^2 = 8(x+2)$ 2) $(y+3)^2 = 16(x-2)$
3) $(y+3)^2 = 8(x-2)$ 4) $(y+3)^2 = 32(x-2)$

16. Equation of a parabola whose vertex is (-3, 4), axis is parallel to the y axis and the latusrectum 12 is
1) $(y-4)^2 = 12(x+3)$ 2) $(y+4)^2 = 12(x-3)$

3) $(x+3)^2=12(y-4)$ 4) $(x-3)^2=12(y+4)$

17. Equation of the parabola having focus (3, 2) and vertex (-1, 2) is

1) $(x+1)^2=16(y-2)$ 2) $(x-1)^2=16(y+2)$

3) $(y-2)^2=16(x+1)$ 4) $(y+2)^2=16(x-1)$

18. Equation of the parabola having focus (3, -2) and vertex (3, 1) is

1) $(x-3)^2=12(y-1)$ 2 $(x-3)^2=-12(y-1)$

3) $(y-1)^2=12(x-3)$ 4) $(y-1)^2=-12(x-3)$

19. Equation of the parabola whose axis is horizontal and passing through the points (-2, 1), (1, 2), (-1, 3) is

1) $5y^2-2x+10y+20=0$

2) $5y^2+2x-21y+20=0$

3) $5y^2+2x-21y+40=0$

4) $3y^2-9x+10y-15=0$

20. Equation of the parabola whose axis is vertical and passing through the points (4, 5), (-2, 11), (-4, 21) is

1) $x^2+6x-7y+10=0$ 2) $x^2-6x+9y+13=0$

3) $x^2-4x+6y-12=0$ 4) $x^2-4x-2y+10=0$

21. If (9, 12) is one end of a focal chord of the parabola $y^2=16x$ then the slope of the chord is

1) 5/12 2) 7/3 3) 12/5 4) 3/7

22. Length of the perpendicular dropped from the focus of the parabola $y^2=-16x$ to a line making the equal intercepts 2 on the positive axes

1) $3\sqrt{2}$ 2) $8\sqrt{2}$ 3) $6\sqrt{2}$ 4) $2\sqrt{2}$

23. The ordinate of a point on the parabola $y^2=18x$ is one third of its length of the latusrectum. Then the length of subtangent at the point is

1) 12 2) 8 3) 6 4) 4

24. The parabola $y^2=kx$ passes through (9, 6). Then the length of subnormal at that point is

1) 2 2) 4 3) $\frac{1}{2}$ 4) 1

25. The focal distance of a point on the parabola $y^2=8x$ is 10. Its coordinates are

1) $(2,\pm 2)$ 2) $(3,\pm 3)$ 3) $(5,\pm 5)$ 4) $(8,\pm 8)$

26. The parabola $x^2=py$ passes through (12, 16). Then the focal distance of the point is

1) $\frac{57}{4}$ 2) $\frac{73}{4}$ 3) 13 4) 18

27. A parabola with vertex at the origin and axis along the y axis passes through (6, 4), then its directrix is

1) 4y+7=0 2) 2y+9=0 3) 2y+7=0 4) 4y+9=0

28. If the parabola $y^2=4ax$ passes through (2, -6) then the equation of the latusrectum is

1) 2x-9=0 2) 4x-9=0 3) 2x+9=0 4) 4x+9=0

29. If O is the vertex and L, L' are the extremities of the latusrectum of the parabola $y^2=4ax$ then the area of the triangle OLL' is

1) $4a^2$ sq.units 2) $2a^2$ sq.units

3) a^2 sq.units 4) $8a^2$ sq.units

30. L, L' are the ends of the latusrectum of the parabola $x^2=6y$. The equation of OL and OL' where O being the origin is

1) $x^2+4y^2=0$ 2) $x^2-4y^2=0$

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

31. If the parabola $y^2=4ax$ passes through (-3, 2) then the length of its latusrectum is

1) $\frac{2}{3}$ 2) $\frac{1}{3}$ 3) $\frac{4}{3}$ 4) 4

32. If (9, 12) is one end of a double ordinate of the parabola $y^2=16x$ then its equation is

1) $x+9=0$ 2) $y+9=0$

3) $y-9=0$ 4) $x-9=0$

33. The point on the parabola $x^2=y$ which is nearest to (3, 0) is

1) (1, -1) 2) (-1, 1) 3) (-1, -1) 4) (1, 1)

34. The angle subtended by the double ordinate of length 16 of the parabola $y^2=8x$ at its vertex is

1) $\frac{\pi}{6}$ 2) $\frac{\pi}{4}$ 3) $\frac{\pi}{3}$ 4) $\frac{\pi}{2}$

35. If the join of ends of the latusrectum of $x^2=8y$ subtends an angle θ at the vertex of the parabola then $\cos\theta=$

1) $\frac{-4}{5}$ 2) $\frac{-2}{3}$ 3) $\frac{-3}{5}$ 4) $\frac{-1}{5}$

36. The point on the parabola $y^2=36x$ whose ordinate is three times its abscissa is

1) (4, 12) 2) (3, 9) 3) (6, 18) 4) (1, 3)

37. Which of the following equations represents a parabola

1) $(x-y)^3=3$ 2) $\frac{x}{y}-\frac{y}{x}=0$

3) $\frac{x}{y}+\frac{4}{x}=0$ 4) $(x+y)^2+3=0$

38. If 2x+y+a=0 is a focal chord of the parabola $y^2=-8x$ then a =
1) 2 2) -2 3) 4 4) -4

39. The point on $y^2=4ax$ nearest to the focus has its abscissa equal to
1) $-a$ 2) a 3) $\frac{a}{2}$ 4) 0

40. $y=\sqrt{x}$ represents
1) part of ellipse 2) semi parabola
3) parabola 4) circle

41. The length of the latusrectum of the parabola $2y^2+3y+4x-2=0$ is
1) $\frac{3}{2}$ 2) $\frac{1}{3}$ 3) 2 4) 6

42. Equation of the axis of the parabola $y^2+6y-2x+5=0$ is
1) y+3=0 2) 2y+3=0 3) y+2=0 4) y-2=0

43. The axis of symmetry of the conic $y=ax^2+bx+c$ is
1) y=0 2) x=0
3) b+2ax=0 4) y=ax

44. Vertex of the parabola $2y^2+3y+4x-2=0$ is
1) $\left(\frac{25}{32},\frac{-7}{4}\right)$ 2) $\left(\frac{25}{32},\frac{-3}{4}\right)$ 3) $\left(\frac{15}{32},\frac{7}{4}\right)$ 4) $\left(\frac{17}{32},\frac{-3}{4}\right)$

45. Vertex of the parabola $4x^2-12x+8y-15=0$ is
1) $\left(\frac{5}{2},3\right)$ 2) $\left(\frac{7}{2},3\right)$ 3) $\left(\frac{3}{2},3\right)$ 4) $\left(\frac{1}{2},3\right)$

46. Focus of the parabola $4x^2-12x+8y+13=0$ is
1) $\left(\frac{3}{2},-2\right)$ 2) $\left(\frac{3}{2},-5\right)$ 3) $\left(\frac{3}{2},-3\right)$ 4) $\left(\frac{3}{2},-1\right)$

47. Focus of the parabola $4y^2-20x-8y+39=0$ is
1) (5, 1) 2) (4, 1) 3) (3, 1) 4) (6, 1)

48. Equation of the directrix of the parabola $y^2=5x-4y-9$ is
1) 2x+1=0 2) 4x+1=0 3) 6x+1=0 4) 4x-1=0

49. Equation of the directrix of the parabola $x^2-y-2x=0$ is
1) 2y+5=0 2) 2y+3=0 3) 4y+5=0 4) 4y+9=0

50. Equation of the tangent at the vertex of the parabola $x^2+4x+4y+16=0$ is
1) y+3=0 2) y+4=0 3) y+2=0 4) y+1=0

51. Equation of the latusrectum of the parabola $x^2+8x+12y+4=0$ is
1) y+3=0 2) y+2=0 3) y+1=0 4) y+5=0

52. One end of latusrectum of the parabola $(x+2)^2=-4(y+3)$ is
1) (-4, -6) 2) (-4, 6) 3) (-4, -4) 4) (2, -6)

53. The ends of latusrectum of a parabola are(6, 7), (6, -1). Its vertex is
1) (8, 3) 2) (-4, 3) 3) (10, 3) 4) (2, 3)

54. Area of the triangle formed by the vertex, focus and one end of latusrectum of the parabola $(x+2)^2=-12(y-1)$ is
1) 18 2) 36 3) 12 4) 9

55. Equation of the circle on the latusrectum of $y^2=8x$ as ends of diameter is
1) $x^2+y^2-4y+16=0$ 2) $x^2+y^2-4x-12=0$
3) $x^2+y^2+4x+12=0$ 4) $x^2+y^2-6x-12=0$

56. If the parabola $(y-2)^2=p(x+1)$ passes through (3, 6) then its directrix is
1) x+2=0 2) 4x+5=0 3) 4x+3=0 4) 4x-1=0

57. A parabola with vertex (2, 3) and axis parallel to the y axis passes through (4, 5). Then its length of latusrectum is
1) 5 2) 8 3) 2 4) 6

58. The length of the latusrectum of a conic is 5. Its focus is (-1, 1) and its directrix is 3x-4y+2=0 then the conic is
1) a parabola 2) an ellipse
3) a hyperbola 4) a R.H.

59. AB is a focal chord of the parabola $y^2=4ax$. If A = (4a, 4a) then B =
1) $\left(\frac{a}{2},\frac{-a}{4}\right)$ 2) $\left(\frac{a}{4},-a\right)$ 3) $\left(\frac{a}{2},\frac{-a}{2}\right)$ 4) $\left(\frac{a}{4},-4a\right)$

60. If b and c are the lengths of the segments of a focal chord of the parabola $y^2=4ax$ then the length of its semilatusrectum is
1) $\frac{bc}{b+c}$ 2) $\frac{4bc}{b+c}$ 3) $\frac{b+c}{2bc}$ 4) $\frac{2bc}{b+c}$

61. If (4, 8) is one end of a focal chord of the parabola $y^2=16x$ then its equation is
1) y=8 2) x=4 3) x+y=12 4) x-y=16

62. One extremity of a focal chord of $y^2=16x$ is A(1, 4). Then the length of the focal chord at A is
1) $\frac{25}{4}$ 2) $\frac{25}{2}$ 3) $\frac{15}{2}$ 4) 25

63. PSQ is a focal chord of the parabola $y^2=16x$. If

P=(1, 4) then $\frac{SP}{SQ}=$

1) $\frac{3}{4}$ 2) $\frac{2}{3}$ 3) $\frac{1}{9}$ 4) $\frac{1}{4}$

64. Equation of the focal chord of the parabola $y^2=4x$ inclined an angle $\frac{\pi}{4}$ with the x axis is
1) x+y-5=0 2) x-y+2=0
3) x-y+4=0 4) x-y-1=0

65. If $(x_1,y_1)(x_2,y_2)$ are the extremities of a focal chord of the parabola $y^2=16x$ then $4x_1x_2+y_1y_2=$
1) -48 2) 0 3) -64 4) 16

66. If S is the focus and PQ is a focal chord of the parabola $y^2=4ax$ then SP, the semilatusrectum, and SQ are in
1) AP 2) GP 3) HP 4) AGP

67. PQ is a double ordinate of the parabola $y^2=4ax$. Then the locus of its point of trisection is
1) $7y^2=4ax$ 2) $11y^2=4ax$
3) $13y^2=4ax$ 4) $9y^2=4ax$

68. Equation of the tangent to $x^2-4x-8y+12=0$ at $\left(4,\frac{3}{2}\right)$ is
1) x+2y-1=0 2) x+2y+1=0
3) x-2y+1=0 4) x-2y-1=0

69. Equation of the tangent to $y^2=6x$ at the positive end of the latusrectum is
1) 2x-2y+3=0 2) 2x+2y+3=0
3) y=4 4) y+4=0

70. Equation of the tangent to $y^2=8x$ inclined at an angle 30^0 to the axis is
1) $x+\sqrt{3}y+6=0$ 2) $x-\sqrt{3}y+6=0$
3) $\sqrt{3}x+y+6=0$ 4) $\sqrt{3}x-y+6=0$

71. A tangent to $y^2=7x$ is equally inclined with the coordinate axes. Then the area of the triangle formed by the tangent with the coordinate axes is
1) $\frac{25}{16}$ 2) $\frac{49}{32}$ 3) $\frac{36}{25}$ 4) $\frac{49}{36}$

72. If the line x-3y+k=0 touches the parabola $3y^2=4x$ then the value of k is
1) 5 2) 7 3) 6 4) 3

73. If the line 2x+3y+k=0 touches the parabola $x^2=108y$ then k =
1) 27 2) 18 3) 24 4) 36

74. If the line y=3x+1 touches the parabola $y^2=4ax$ then its length of latusrectum is
1) 24 2) 16 3) 12 4) 18

75. Equation of the common tangent to $y^2=4x$ and $x^2=32y$ is
1) x+2y+4=0 2) x+2y+8=0
3) 2x+y+8=0 4) 2x+y-16=0

76. Equation of the common tangent to the parabola $y^2=24x$ and the circle $x^2+y^2=18$ is
1) x+y+6=0 2) x+y+4=0
3) 2x+y-9=0 4) x+2y-8=0

77. The point of intersection of the two tangents at the ends of the latusrectum of the parabola $(y+3)^2=8(x-2)$ is
1) (0, -4) 2) (0, -3) 3) (-1, -3) 4) (-2, -3)

78. A tangent to the parabola $y^2=4ax$ meets the axes at A and B. Then the locus of mid point of $\overline{AB}$ is
1) $y^2+2ax=0$ 2) $y^2-2ax=0$
3) $2y^2+ax=0$ 4) $4y^2+ax=0$

79. Equation of the tangent to $y^2=8x$ which is parallel to x – y+3=0 is
1) x-y+4=0 2) x-y+5=0
3) x-y+2=0 4) x-y+7=0

80. Equation of the tangent to $y^2=16x$ which is perpendicular to $2x-y+5=0$ is
1) x+2y+16=0 2) x+2y-17=0
3) x+2y-19=0 4) x+2y-18=0

81. Equation of the tangent to $y^2=4a(x+a)$ having slope 1 is
1) x-y+2a=0 2) x+y+a=0
3) x+y-4a=0 4) x-y-2a=0

82. If the line 7x+6y-13=0 touches the parabola $y^2-7x-8y+14=0$ then the point of contact is
1) (2, 1) 2) (1, -1)
3) (-1, 1) 4) (1, 1)

83. A tangent to $y^2=5x$ is parallel to the line y=4x+1. Then the point of contact is
1) $(5,5)$ 2) $\left(\frac{5}{64},\frac{5}{8}\right)$ 3) $\left(\frac{5}{8},\frac{5}{64}\right)$ 4) $(2,7)$

84. With respect to the parabola $y^2=4x$ the foot of the perpendicular from (1, 0) on the line y=x+1
1) lies on the tangent at the vertex
2) lies on the line x=2
3) lies on the line x=3
4) lies on the directrix

85. For all values of m the line $y=m(x-a)-\frac{a}{m}$ touches the parabola

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

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

86. If the line y=x+2a touches the parabola $y^2=4a(x+a)$ then the point of contact is

1) (2a,0) 2) (a,a) 3) (0,2a) 4) (– a,a)

87. The straight line x+y=k+1 touches the parabola y = x (1-x) if

1) k=– 1 2) k=0

3) k=1 4) k takes any real value

88. Equation of the tangent at the point t=– 3 to the parabola $y^2=3x$ is

1. $12x+4y+27=0$ 2) $4x+12y-27=0$

3) $4x+12y+27=0$ 4) $12x+4y-27=0$

89. If the tangents to the parabola $y^2=4ax$ at (x_1,y_1) and (x_2,y_2) meet on the axis then

1) $x_1=-x_2$ 2) $x_1=x_2$ 3) $y_1=y_2$ 4) $y_1=-y_2$

90. If the tangents to the parabola $y^2=4ax$ make complementary angles with the axis of the parabola then $t_1t_2=$

1) 0 2) 1 3) -1 4) -2

91. If the tangents at t_1,t_2,t_3 on $y^2=4ax$ make angles $30^0,45^0,60^0$ with the axis then t_1,t_2,t_3 are in

1) A.P. 2) G.P. 3) H.P. 4) A.G.P.

92. Number of tangents drawn from (-2, -3) to the parabola $2y^2=9x$ is

1) 3 2) 0 3) 1 4) 2

93. Sum of the slopes of the two tangents drawn from (3, 5) to $y^2=8x$ is

1) $\frac{7}{3}$ 2) 5 3) $\frac{5}{3}$ 4) $\frac{8}{3}$

94. Product of the slopes of the two tangents drawn from (2, 3) to $y^2=4x$ is

1) $\frac{5}{2}$ 2) $\frac{3}{2}$ 3) 1 4) $\frac{1}{2}$

95. The slopes of the two tangents drawn from $\left(\frac{3}{2},5\right)$ to $y^2=6x$ are

1) $3,\frac{1}{3}$ 2) $5,\frac{1}{5}$ 3) $7,3$ 4) $5,2$

96. If θ is the angle between the two tangents to $y^2=12x$ from the point (1, 4) then $\tan\theta=$

1) $\frac{2}{3}$ 2) $\frac{3}{4}$ 3) $\frac{3}{5}$ 4) $\frac{1}{2}$

97. Two tangents to the parabola $(y-1)^2=4(x-2)$ are at right angles. Then the locus of their point of intersection is

1) x-3=0 2) x-1=0 3) 2x-1=0 4) 3x-1=0

98. The locus of point of intersection of the two tangents to $y^2=4ax$ inclined at an angle 45^0 is

1) $x^2+y^2-4ax+2a^2=0$

2) $x^2-y^2+6ax+a^2=0$

3) $x^2+y^2+8ax+4a^2=0$

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

99. Two tangents to the parabola $y^2=4ax$ make angles θ_1,θ_2 with the x-axis. Then the locus of their point of intersection if $\cot\theta_1+\cot\theta_2=c$ is

1) $x=ac$ 2) $y^2-2ax=cx^2$ 3) $y=ca$ 4) $y=cx$

100. Two tangents to the parabola $y^2=4ax$ make supplimentary angles with the x axis. Then the locus of their point of intersection is

1) x=a 2) x=ak 3) y=0 4) x+y=a

101. If P is a point on the parabola $y^2=4ax$ in which the abscissa is equal to ordinate then the equation of the normal at P is

1) $2x+y+12a=0$ 2) $2x+y-12a=0$

3v $2x+y-18a=0$ 4) $x+2y-12a=0$

102. If the line $x-y+k=0$ is a normal to $y^2=4ax$ then the value of k is

1) 4a 2) -a 3) -5a 4) -3a

103. Equation of the normal to $y^2=4x$ which is perpendicular to $x+3y+1=0$ is

1) 3x-y-33=0 2) 3x-y+17=0

3) 3x-y+19=0 4) 3x-y+27=0

104. If a normal is drawn to $y^2=12x$ making an angle 45^0 with the axis then the foot of the normal is

1) (3, 8) 2) (3, -6) 3) (12, -12) 4) (8, -8)

105. If the normal at P(18, 12) to the parabola $y^2=8x$ cuts it again at Q then Q =

1) $\left(\frac{242}{9},\frac{-44}{3}\right)$ 2) $\left(\frac{121}{9},\frac{-44}{3}\right)$

3) $\left(\frac{-121}{9},\frac{44}{3}\right)$ 4) $\left(\frac{121}{3},\frac{-77}{9}\right)$

106. If the normals at the points (x_1,y_1), (x_2,y_2) on the parabola $y^2=4ax$ intersect on the parabola then

$x_1x_2 + y_1y_2 =$

1) $-3a^2$ 2) $12a^2$ 3) $8a^2$ 4) $16a^2$

107. If the normal at A on the parabola $y^2 = 4ax$ meets the axis at B and If S is the focus of the parabola then

1) SA=SB 2) SA=2SB

3) SA=4SB 4) $SA = \frac{1}{2}SB$

108. If the normal at t_1 on the parabola $y^2 = 4ax$ meets the curve again at t_2 then $t_1^2 + t_1t_2 =$

1) -2 2) 0 3) -1 4) 2

109. The ordinates of the feet of three normals to the parabola $y^2 = 4ax$ from the point (6a, 0) are

1) $0, -3a, 3a$ 2) $0, -2a, 2a$

3) $0, -4a, 4a$ 4) $0, -5a, 5a$

110. The subtangent, ordinate of the point, and sub-normal to the parabola $y^2 = 12x$ at $\left(\frac{4}{3}, 4\right)$ are in

1) A.P. 2) H.P. 3) G.P. 4) A.G.P.

111. Equation of the normal at t=4 to the parabola $y^2 = 6x$ is

1) $4x + y - 108 = 0$ 2) $4x + y + 108 = 0$

3) $x + 4y + 108 = 0$ 4) $x + 4y - 108 = 0$

112. At any point P on the parabola $y^2 = 4ax$ a normal PG is drawn intersecting the axis in G. If S is the focus of the parabola then $PG^2 =$

1) 2a.SP 2) 3a.SP 3) a.SP 4) 4a.SP

113. If the line 5x-4y-12=0 meets the parabola $x^2 = 8y$ in A and B then the point of intersection of the two tangents at A and B is

1) (5, 3) 2) (3, 5) 3) (4, 6) 4) (6, 4)

114. Length of the chord of contact of (2, 5) with respect to $y^2 = 8x$ is

1) $\frac{3\sqrt{41}}{2}$ 2) $\frac{2\sqrt{17}}{3}$ 3) $\frac{7\sqrt{3}}{5}$ 4) $\frac{5\sqrt{3}}{7}$

115. Area of the triangle formed by the pair of tangents drawn from (-1, 4) to $y^2 = 16x$ and the chord of contact of (–1,4) is

1) $8\sqrt{2}$ 2) $16\sqrt{3}$ 3) $5\sqrt{2}$ 4) $16\sqrt{2}$

116. If the chord of contact of tangents from P to the parabola $y^2 = 4ax$ touches the circle $x^2 + y^2 = b^2$ then the equation of the locus of P is

1) $a^2x^2 = b^2\left(y^2 + 4a^2\right)$ 2) $4a^2x^2 = b^2\left(y^2 + 4a^2\right)$

3) $2a^2x^2 = b^2\left(4y^2 + a^2\right)$ 4) $a^2x^2 = 4b^2\left(y^2 + a^2\right)$

117. Pole of the line x-2y+3=0 w.r.to $y^2 = 4x$ is

1) (4, 3) 2) (3, 4) 3) (1, 2) 4) (2, 1)

118. Pole of the line x+y+2=0 w.r.to the parabola $y^2 + 4x - 2y - 3 = 0$ is

1) (5, 3) 2) (-5, 3) 3) (4, 3) 4) (-4, 3)

119. If the lines $2x + 3y + 12 = 0$ and $x - y + 4p = 0$ are conjugate w.r.to $y^2 = 8x$ then p=

1) -5 2) 4 3) 7 4) -3

120. If (2, 4), (p, 6) are conjugate points w.r.to $y^2 = 16x$ then the value of p is

1) -2 2) 5 3) -3 4) 1

121. Pole of 3x+4y-4=0 w.r.to $x^2 = 4y$ is

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

3) $\left(-1, \frac{-5}{2}\right)$ 4) $(2, 3)$

122. If the polar of P w.r.to the circle $x^2 + y^2 = a^2$ touches the parabola $y^2 = 4ax$, then the locus of P is

1) $y^2 + 2ax = 0$ 2) $y^2 + 3ax = 0$

3) $y^2 + ax = 0$ 4) $2y^2 + ax = 0$

123. If the polar of P w.r.to $y^2 = 4ax$ touches the circle $x^2 + y^2 = 4a^2$ then the locus of P is

1) $2x^2 - y^2 = 4a^2$ 2) $x^2 - 2y^2 = 4a^2$

3) $x^2 - y^2 = 4a^2$ 4) $3x^2 - y^2 = a^2$

124. The locus of poles of focal chords of the parabola $y^2 = 4ax$ is

1) x+2a=0 2) x+a=0 3) x+4a=0 4) x-2a=0

125. The locus of poles of chords of the parabola $y^2 = 4ax$ which subtend a right angle at the vertex of the parabola is

1) x+4a=0 2) x+2a=0 3) x+a=0 4) x+6a=0

126. Equation of the chord of the parabola $y^2 = 8x$ which is bisected at the point (2, -3) is

1) 4x+3y+1=0 2) 3x+4y+6=0

3) 2x-3y-13=0 4) x-y+5=0

127. The condition for the line 4x+3y+k=0 to intersect $y^2 = 8x$ is

1) $K < \frac{9}{2}$ 2) $K > 5$ 3) $K > \frac{15}{2}$ 4) $K > 6$

128. The mid point of the chord of the parabola $y^2 = 2x$ is (1,1). Then the point of intersection of the two tangents at the extremeties of the chord is

1) (0,3) 2) (0, 1) 3) $\left(0, \frac{5}{2}\right)$ 4) $(0, 2)$

129. If the line 4x+3y+1=0 meets the parabola $y^2 = 8x$ then the mid point of the chord is

1) $(-1, 1)$ 2) $(2, -3)$ 3) $(3, -3)$ 4) $(5, -7)$

130. If the locus of mid points of the chords of the

parabola $y^2 = 4ax$ which passes through a fixed point (h, k) is also a parabola then its length of latusrectum is

1) a 2) 3a 3) $\frac{7a}{2}$ 4) 2a

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

1) $y^2 = 2ax$ 2) $y^2 = 2a(x-a)$
3) $y^2 = a(x-a)$ 4) $2y^2 = ax$

132. The locus of mid points of the chords of the parabola $y^2 = 4(x+1)$ which are parallel to 3x=4y is

1) 5y-8=0 2) 3y+10=0
3) 5y+9=0 4) 3y-8=0

133. If a chord 4y=3x-48 subtends an angle θ at the vertex of the parabola $y^2 = 64x$ then $\tan\theta =$

1) $\frac{10}{9}$ 2) $\frac{13}{9}$ 3) $\frac{20}{9}$ 4) $\frac{16}{9}$

134. The length of the chord 4y=3x+8 of the parabola $y^2 = 8x$ is

1) $\frac{320}{7}$ 2) $\frac{320}{9}$ 3) $\frac{80}{9}$ 4) $\frac{640}{7}$

135. Length of the chord intercepted by the line x+y=5 on the parabola $y = x^2 + 3x$ is

1) $4\sqrt{2}$ 2) $6\sqrt{2}$ 3) $10\sqrt{2}$ 4) $5\sqrt{2}$

136. $y = x\sqrt{2} - 4a\sqrt{2}$ is a normal chord to $y^2 = 4ax$. Then its length is

1) $8a\sqrt{3}$ 2) $4a\sqrt{3}$ 3) $6a\sqrt{3}$ 4) $2a\sqrt{3}$

137. The point of intersection of the tangents at the points on the parabola $y^2 = 4x$ whose ordinates are 4 and 6 is

1) (6, 5) 2) (7, 3) 3) (9, 10) 4) (6, 10)

138. If y_1 and y_2 are the ordinates of two points P and Q on a parabola and y_3 is the ordinate of the point of intersection of the tangents at P and Q then

1) y_1, y_2, y_3 are in A.P. 2) y_1, y_3, y_2 are in A.P.
3) y_1, y_2, y_3 are in G.P. 4) y_1, y_3, y_2 are in G.P.

139. If the tangents at $\left(at_1^2, 2at_1\right)$ and $\left(at_2^2, 2at_2\right)$ on the parabola $y^2 = 4ax$ intersect on the axis then

1) $t_1 = \frac{2}{t_2}$ 2) $t_1t_2 = -4$ 3) $t_1t_2 = -1$ 4) $t_1 = -t_2$

140. If the tangents at P and Q on the parabola $y^2 = 4ax$ meet in T and if S is the focus of the parabola then SP, ST, SQ are in

1) A.P. 2) G.P. 3) H.P. 4) A.G.P.

141. If A, B, C are three points on a parabola and PQR is the triangle formed by three tangents at A, B, C then

1) $\Delta ABC = 2\Delta PQR$ 2) $\Delta ABC = \Delta PQR$
3) $\Delta ABC = 3\Delta PQR$ 4) $\Delta ABC = 4\Delta PQR$

142. Tangents are drawn from P to $y^2 = 4ax$. If the difference of the ordinates of the points of contact of the two tangents is l then the equation to the locus of P is

1) $y^2 - 4ax = l^2$ 2) $y^2 - 4ax = \frac{l^2}{2}$

3) $y^2 - 4ax = \frac{l^2}{4}$ 4) $y^2 - 4ax = 2l^2$

143. If the chord joining the points t_1 and t_2 on the parabola $y^2 = 4ax$ subtends a right angle at its vertex then $t_2 =$

1) $\frac{2}{t_1}$ 2) $\frac{-2}{t_1}$ 3) $\frac{4}{t_1}$ 4) $\frac{-4}{t_1}$

144. If t_1, t_2, t_3 are the feet of the normals drawn from (x_1, y_1) to $y^2 = 4ax$ then $t_1t_2 + t_2t_3 + t_3t_1 =$

1) 0 2) $\frac{y_1}{a}$ 3) $\frac{2a - x_1}{a}$ 4v $\frac{x_1 - 2a}{a}$

145. The point of intersection of normals to the parabola $y^2 = 4x$ at the points whose ordinates are 4 and 6 is

1) (30, -21) 2) (21, -30)
3) (17, -19) 4) (19, -18)

146. The area of the triangle inscribed in the parabola $y^2 = 4x$ with the vertices, whose ordinates are 1, 2, 4 is

1) $\frac{7}{2}$ sq.units 2) $\frac{5}{2}$ sq.units

3) $\frac{3}{2}$ sq.units 4) $\frac{3}{4}$ sq.units

147. If the locus of the point $\left(4t^2 - 1, 8t - 2\right)$ represents a parabola then the equation of latusrectum is

1) x-5=0 2) 2x-7=0 3) x+5=0 4) x-3=0

148. The tangents to the parabola $y^2 = 4ax$ at $P(t_1)$ and $Q(t_2)$ intersect at R. Then the area of ΔPQR is

1) $\frac{a^2}{2}(t_1 - t_2)^2$ 2) $\frac{a^2}{2}(t_1 - t_2)$

3) $\frac{a^2}{2}(t_1 - t_2)^3$ 4) $a^2(t_1 - t_2)^2$

149. If P is a point on the parabola $y^2 = 4ax$ such that the subtangent and subnormal at P are equal then the coordinates of P are

1) $(a, 2a)$ or $(a, -2a)$

2) $\left(2a,2a\sqrt{2}\right)$ or $\left(2a,-2a\sqrt{2}\right)$

3) $(4a,-4a)$ or $(4a,4a)$

4) $(5a,-5a)$ or $(5a,-3a)$

150. P(-3, 2) is one end of focal chord PQ of the parabola $y^2+4x+4y=0$. Then the slope of the normal at Q is

1) $\frac{-1}{2}$ 2) 2 3) $\frac{1}{2}$ 4) -2

KEY

1. 1	2. 4	3. 1	4. 4	5. 4
6. 2	7. 3	8. 3	9. 4	10.2
11. 1	12. 3	13. 1	14. 1	15.3
16. 3	17. 3	18. 2	19. 2	20. 4
21. 3	22. 1	23. 4	24. 1	25. 4
26. 2	27. 4	28. 1	29. 2	30. 2
31. 3	32. 4	33. 4	34. 4	35. 3
36. 1	37. 3	38. 3	39. 4	40. 2
41. 3	42. 1	43. 3	44. 2	45. 3
46. 4	47. 3	48. 2	49. 3	50. 1
51. 2	52. 3	53. 1	54. 4	55. 2
56. 1	57. 3	58. 3	59. 2	60. 4
61. 2	62. 4	63. 4	64. 4	65. 2
66. 3	67. 4	68. 4	69. 1	70. 2
71. 2	72. 4	73. 4	74. 3	75. 1
76. 1	77. 2	78. 3	79. 3	80. 1
81. 1	82. 4	83. 2	84. 1	85. 4
86. 3	87. 2	88. 3	89. 4	90. 2
91. 2	92. 4	93. 3	94. 4	95. 1
96. 4	97. 2	98. 2	99. 3	100.3
101. 2	102. 4	103. 1	104. 2	105. 1
106. 2	107. 1	108. 1	109. 3	110. 3
111. 1	112. 4	113. 1	114. 1	115. 4
116. 2	117. 2	118. 1	119. 4	120.4
121. 1	122. 3	123. 3	124. 2	125. 1
126. 1	127. 1	128. 2	129. 2	130. 4
131. 1	132. 4	133. 3	134. 3	135. 2
136. 3	137. 1	138. 2	139. 4	140. 2
141. 1	142. 3	143. 4	144. 3	145. 2
146. 4	147. 4	148. 3	149. 1	150. 1

HINTS

11. Focus (1, 2) directrix is 2x-3y+1=0
equation of latusrectum is 2x-3y=-4; 2x-3y+4=0
equation of tangent at vertex is $2x-3y+\frac{5}{2}=0$ i.e.,
4x-6y+5=0

19. Since the axis is horizontal select the parabola equation in the form $y^2+Dy+Ex+F=0$ satisfying the given points.

20. Since the axis is vertical select the parabola equation in the form $x^2+Dx+Ey+F=0$ satisfying the given points.

34. Length of double ordinate is 16. Hence points on the parabola $y^2=8x$ are $(x,\pm 8)$.
$\therefore$ points are $(8,\pm 8)$
Angle at vertex is $\frac{\pi}{2}$

58. Semilatusrectum $l=\frac{5}{2}$

$$d=\frac{1-3-4+21}{5}=1$$

$$\frac{l}{d}=\frac{5/2}{1}=\frac{5}{2}=e$$

$\therefore e>1$ conic is hyperbola.

63. $p=(1,4)=p\left(4t^2,8t\right)$

$$\therefore t=\frac{1}{2} \qquad \frac{SP}{SQ}=t^2=\frac{1}{4}$$

68. To get the equation of the tangent write $S_1=0$ and simplify.

77. For the parabola $(y+3)^2=8(x-2)$
equation of axis is y = -3
equation of directrix is x=2-2=0
point of intersection of tangents is (0, -3)

81. Take the tangent equation in the form $y=m(x+a)+\frac{a}{m}$ put m=1 and simplify.

82. Select the point satisfying the line and the parabola equations.

84. For $y^2=4x$ (1,0) is focus and y=x+1 is a tangent. Hence foot of the perpendicular lies on the tangent at the vertex.

87. Solve $x+y=k+1, y=x(1-x)$
$x^2-2x+k+1=0$
since the line touches the parabola
$b^2-4ac=4-4(k+1)=0$
$\therefore k=0$

100. $\theta, 180-\theta$ be the angles
$m_1=\tan\theta, m_2=-\tan\theta$
sum of the slopes $m_1+m_2=\frac{y_1}{x_1}$
equation to locus is y=0

105. $P=(18,12)=\left(2t^2,4t\right)$ $\therefore t=3$
normal at P meets at $Q(t_1)$

$$t_1=-3-\frac{2}{3}=\frac{-11}{3}$$

$Q\left[2\times\frac{121}{9}, 4\times-\frac{11}{3}\right]=\left(\frac{242}{9},\frac{-44}{3}\right)$

109. Equation of the normal with slope m is $y=mx-2am-am^3$ passes through (6a, 0)
$\therefore$ values of m are 0, 2, -2
put m = 0, 2, -2 in -2am

112. normal at p(t) is $tx+y=2at+at^3$
$G=\left(2a+at^2,0\right)$
$PG^2=4a^2+4a^2t^2=4a\left(a+at^2\right)=4a.sp$

113. Compare $\begin{matrix} xx_1-4y-4y_1=0 \\ 5x-4y-12=0 \end{matrix}$ then $(x_1,y_1)=(5,3)$

127. Condition for y=mx+c to intersect $y^2=4ax$ is $a-mc>0$.

130. Locus of mid points of chords of a parabola passing through a fixed point is also a parabola having length of latusrectum half the length of latusrectum of the given parabola.

135. Solve $y=x^2+3x$ and x+y=5
points of intersection (-5, 10)(1, 4)
length of chord = $\sqrt{36+36}=6\sqrt{2}$

142. $p=(x_1,y_1)$ Let t_1,t_2 be the points of contact
$(x_1,y_1)=\left[at_1t_2, a(t_1+t_2)\right]$
From data $2a(t_1-t_2)=l$
$4a^2\left[(t_1+t_2)^2-4t_1t_2\right]=l^2$
$4a^2\left[\frac{y_1^2}{a^2}-4\frac{x_1}{a}\right]=l^2$
$y^2-4ax=\frac{l^2}{4}$

146. Area = $\left|\frac{(y_1-y_2)(y_2-y_3)(y_3-y_1)}{8a}\right|$

150. Slope of the tangent at $p=\left(\frac{dy}{dx}\right)_p=\frac{-1}{2}$
slope of the normal at Q is also $\frac{-1}{2}$
(At the extremeties of focal chord the tangent and normal are parallel)

LEVEL-2

1. The focus of a parabola is (1, 2) and the point of intersection of the directrix and axis is (2, 3). Then the equation of the parabola is
1) $(x-1)^2+(y-2)^2=\frac{1}{4}(x+y-5)^2$
2) $(x-1)^2+(y-2)^2=\frac{1}{2}(x+y-5)^2$
3) $(x-1)^2+(y-2)^2=\frac{1}{5}(x+y-5)^2$
4) $(x-1)^2+(y-2)^2=\frac{1}{25}(x+y-5)^2$

2. If the vertex and focus of a parabola are (2, 1) and (1, -1) then its equation is
1) $4x^2+y^2-4xy+8x+46y-65=0$
2) $4x^2+y^2-4xy-8x-46y+72=0$
3) $4x^2+y^2-4xy+8x+46y-71=0$
4) $4x^2+y^2-4xy-10x-23y+75=0$

3. If the parabola $y=ax^2+bx+c$ passes through the points (-1, 12), (0, 5), (2, -3) then the value of $a+b+c=$
1) 5 2) -6 3) 0 4) 3

4. If the points (6, 8), (1, 0) lie on the parabola $x^2+Ax-By-2=0$ then the values of A and B are
1) A=1, B=5 2) A=2, B=4
3) A=3, B=-7 4) A=-3, B=8

5. A=(-2, 0) and P is a point on the parabola $y^2=8x$. If Q bisects $\overline{AP}$ and the locus of Q is a parabola then its focus is
1) (0, 0) 2) (1, 1) 3) (5, 0) 4) (4, 0)

6. The equation of directrix and latusrectum of a parabola are 3x-4y+27=0 and 3x-4y+2=0. Then the length of latusrectum is
1) 5 2) 10 3) 15 4) 20

7. A circle with centre lying on the focus of the parabola $y^2=4x$ touches the directrix. Then one point of intersection of the circle and the parabola is
1) (1, 2) 2) (4, 4) 3) (4, -4) 4) $\left(3,2\sqrt{3}\right)$

8. Equation of the parabola with axis 3x+4y-4=0 , the tangent at the vertex 4x-3y+7=0 and with length of latusrectum 4 is
1) $(3x+4y-4)^2=10(4x-3y+7)$
2) $(3x+4y-4)^2=4(4x-3y+7)$
3) $(3x+4y-4)^2=20(4x-3y+7)$
4) $(3x+4y-4)^2=5(4x-3y+7)$

9. If the equation $(2x-y-3)^2=-20(x+2y-4)$ represents a parabola then its vertex is
1) (3, 3) 2) (6, -1) 3) (2, 1) 4) (4, 4)

10. The parabola $y^2=px$ passes through the point of intersection of the lines $\frac{x}{3}+\frac{y}{2}=1$ and $\frac{x}{2}+\frac{y}{3}=1$. Its

focus is

1) $\left(\frac{3}{10},0\right)$ 2) $\left(\frac{3}{5},0\right)$ 3) $\left(\frac{3}{7},0\right)$ 4) $\left(\frac{6}{7},0\right)$

11. Equation of the parabola whose vertex is (0, 0) and focus is the point of intersection of the lines x+y=2, 2x-y=4 is

1) $y^2=2x$ 2) $y^2=4x$ 3) $y^2=8x$ 4) $x^2=8y$

12. The parabola $y^2=2ax$ passes through the centre of the circle $4x^2+4y^2-8x+12y-7=0$. Its directrix is

1) 4x+9=0 2) 4x+15=0 3) 16x+9=0 4) 16x-7=0

13. The length of the double ordinate of the parabola $y^2-8x+6y+1=0$ which is at a distance of 32 units from vertex is

1) 28 2) 30 3) 32 4) 26

14. If the angular bisectors of the coordinate axes cut the parabola $y^2=4ax$ at the points O, A, B then the area of ΔOAB is (O is the origin)

1) $32a^2$ 2) $16a^2$ 3) $64a^2$ 4) $8a^2$

15. The condition that the line y=mx+c to be a tangent to $y^2=4a(x+a)$ is

1) $c=a\left(m+\frac{1}{a}\right)$ 2) $c=a\left(m-\frac{1}{m}\right)$

3) $c=a\left(m+\frac{1}{m}\right)$ 4) $a=c\left(m+\frac{1}{m}\right)$

16. The length of latusrectum of the parabola $(x-2a)^2+y^2=x^2$ is

1) 2a 2) 3a 3) 6a 4) 4a

17. An equilateral triangle is inscribed in the parabola $y^2=\frac{1}{2}x$ so that one of its vertex coincides with the vertex of the parabola. Then the length of its side is

1) $\sqrt{3}$ 2) $2\sqrt{3}$ 3) $3\sqrt{3}$ 4) $4\sqrt{2}$

18. A parabolic arch has a height 18 meters and span 24 meters. Then the height of the arch at 8 meters from the centre of the span is

1) 10 2) 11 3) 12 4) 13

19. A parabola with axis parallel to x axis passes through (0, 0), (2, 1), (4, -1). Its length of latusrectum is

1) $\frac{2}{3}$ 2) $\frac{1}{4}$ 3) $\frac{7}{3}$ 4) $\frac{1}{3}$

20. A point on the parabola $y^2=4ax,$ the foot of the $\perp r$ from it on the directrix and the focus are the vertices of an equilateral triangle. Then the focal distance of the point is

1) 3a 2) 4a 3) $\frac{5a}{3}$ 4) $\frac{8a}{3}$

21. The vertex of a parabola is (2, 0) and its directrix is y axis. The end of latusrectum in the first quadrant is

1) (2, 4) 2) (4, 4) 3) (6, 4) 4) (8, 4)

22. A parabola has x axis as its axis, y axis as its directrix and 4a as its latusrectum. If the focus lies to the left side of the directrix then the equation of the parabola is

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

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

23. If the equation

$$25\left\{(x-5)^2+(y-3)^2\right\}=(3x-4y+1)^2$$

represents a parabola then its axis is

1) 4x+3y-10=0 2) 4x+3y-15=0
3) 4x+3y-29=0 4) 4x+3y-17=0

24. If the equation $136\left(x^2+y^2\right)=(5x+3y+7)^2$ represents a conic then its length of latusrectum is

1) $\frac{7}{2\sqrt{34}}$ 2) $\frac{7}{\sqrt{34}}$ 3) $\frac{14}{\sqrt{34}}$ 4) $\frac{9}{\sqrt{34}}$

25. If the vertex of the parabola $y=x^2-8x+c$ lies on x axis then the value of c is

1) 12 2) 14 3) 8 4) 16

26. Reflection of $y^2=x$ about y axis is

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

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

27. S is the focus and Z is the foot of the perpendicular drawn from S to the directrix of the parabola $(x-2)^2=3(y+1)$. Then the mid point of SZ is

1) (-2, 1) 2) (2, -1) 3) (2, 1) 4) (-2, -1)

28. The focus of a conic is the origin and its corresponding directrix is 7x-y-10=0. If its latusrectum is 2 then its eccentricity is

1) $\sqrt{2}$ 2) 1 3) $\frac{1}{\sqrt{2}}$ 4) $\frac{1}{2}$

29. The number of parabolas passing through the three points (1, 3), (6, 13), (-5, -9) is

1) 3 2) 2 3) 0 4) infinite

30. Perpendiculars are drawn on a tangent to the parabola $y^2=4ax$ from the points $(a\pm k,0)$. The difference of their squares is

1) 4 2) 4a 3) 4k 4) 4ak

31. If the tangents at t_1 and t_2 to a parabola are perpendicular then $(t_1+t_2)^2-(t_1-t_2)^2=$
1) -1 2) -4 3) 6 4) 2

32. For the parabola $y^2=8x$ tangent and normal are drawn at P(2, 4) which meet the axis of the parabola in A and B. Then the length of the diameter of the circle through A, P, B is
1) 2 2) 4 3) 8 4) 6

33. If L_1L_2 is the latusrectum of $y^2=12x$ P is any point on the directrix then the area of $\Delta PL_1L_2=$
1) 32 2) 18 3) 36 4) 16

34. The equations of the tangents at the ends of latusrectum of $y^2=4ax$ are
1) $x\pm y-a=0$ 2) $x\pm y+a=0$
3) $x\pm y-3a=0$ 4) $x\pm y+2a=0$

35. The equations of the normals at the ends of latusrectum of $y^2=4ax$ are
1) $x\pm y-3a=0$ 2) $x\pm y+3a=0$
3) $x\pm y-2a=0$ 4) $x\pm y+2a=0$

36. If two tangents from any point on the directrix to the parabola $y^2=4ax$ touch the parabola at t_1,t_2 then
1) $t_1t_2=-1$ 2) $t_1t_2=1$ 3) $t_1t_2=2$ 4) $t_1t_2=\frac{1}{2}$

37. The angle between the two tangents at the ends of a focal chord of the parabola is
1) $\frac{\pi}{6}$ 2) $\frac{\pi}{4}$ 3) $\frac{\pi}{3}$ 4) $\frac{\pi}{2}$

38. Equation of the two tangents drawn from (1, 4) to the parabola $y^2=12x$ are
1) $x-y+3=0, 3x-y+1=0$
2) $x-y+1=0, x-2y+4=0$
3) $x+y-2=0, x-y=3$
4) $x+y-1=0, x+2y+4=0$

39. The angle between the two tangents drawn from origin to the parabola $y^2=4a(x-a)$ is
1) 90^0 2) 30^0 3) $\tan^{-1}(2)$ 4) 45^0

40. Two tangents to $y^2=4ax$ make angles θ_1,θ_2 with x axis. If $\cos\theta_1\cos\theta_2=k$ then the locus of their intersection is
1) $x^2=k^2\left[(x-a)^2+y^2\right]$
2) $x^2=k^2\left[(x+a)^2+y^2\right]$
3) $x^2=k^2\left[(x-a)^2+4y^2\right]$
4) $4x^2=k^2\left[(x+a)^2+y^2\right]$

41. Locus of the point of intersection of perpendicular tangents drawn one each to the parabolas $y^2=4(x+1), y^2=8(x+2)$ is
1) x+12=0 2) x+8=0 3) x+4=0 4) x+3=0

42. The number of points of intersection of $x^2+y^2=2x$ with $y^2=x$
1) 1 2) 2 3) 3 4) 4

43. The number of points of intersection of $x^2+y^2=4x$ with $y^2=4(x-3)$
1) 1 2) 2 3) 3 4) 4

44. Equation of the common tangent to the circle $x^2+y^2=4ax$ and $y^2=4ax$ is
1) x+y+a=0 2) x=0
3) x=a 4) x-y+a=0

45. If the line $lx+my+n=0$ touches the parabola $y^2=4a(x-b)$ then
1) $al^2=bm^2+nl$ 2) $am^2=bl^2+nl$
3) $an^2=bl^2+nm$ 4) $an^2=bl^2+2nm$

46. A tangent to $y^2=4ax$ meets x axis at T and tangent at vertex A in P and the rectangle TAPQ is completed. Then the locus of Q is given by
1) $y^2+4ax=0$ 2) $y^2+2ax=0$
3) $y^2=2ax$ 4) $y^2+ax=0$

47. The polar of (2, 3) with respect to $y^2=12x$
1) touches the parabola
2) intersects the parabola
3) does not intersect the parabola
4) does not exist

48. The points (a, b), (b, a) are conjugate points w.r.to $y^2=cx$ then c is .... between a and b
1) A.M 2) G.M 3) H.M 4) A.G.P.

49. Equation to the polar of the focus of the parabola $y^2+2x+4y+7=0$ is
1) 2x+1=0 2) x+1=0 3) 2x-1=0 4) x-1=0

50. The polars of (1, 7), (4, 8) w.r.to $y^2=4x$ intersect at C. Then the equation to the polar of C w.r.to the parabola is
1) $x+y-8=0$ 2) $x+y-12=0$
3) $x-3y+20=0$ 4) $x-y+20=0$

51. The coordinates of the point of intersection of tangents drawn to $y^2=4ax$ at the points where it is cut by the line $x\cos\alpha+y\sin\alpha-p=0$ is

1) $(p\tan\alpha, 2a\sec\alpha)$ 2) $(-p\sec\alpha, -2a\tan\alpha)$

3) $(2a\sec\alpha, p\tan\alpha)$ 4) $(p\sec\alpha, 2a\tan\alpha)$

52. The locus of poles of chords of the parabola $y^2 = 4ax$ which subtend a constant angle α at the vertex of the parabola is

1) $(x+4a)^2\tan^2\alpha = 4(y^2-4ax)$

2) $(x+a)^2\tan^2\alpha = y^2-4ax$

3) $(x+a)^2\cot^2\alpha = y^2-4ax$

4) $(x+4a)^2\cot^2\alpha = y^2-4ax$

53. The locus of poles of normal chords of the parabola $y^2 = 4x$ is

1) $y^2(x+4)+8=0$ 2) $y^2(x+2)+4=0$

3) $y^2(x+1)+8=0$ 4) $y^2(x+4)+6=0$

54. The abscissa of the orthocentre of the triangle formed by the lines $y = m_1x+\frac{b}{m_1}$, $y = m_2x+\frac{b}{m_2}$, $y = m_3x+\frac{b}{m_3}$ is

1) b 2) -b 3) 2b 4) -2b

55. The line y=(2x+a) will not intersect the parabola $y^2 = 2x$ if

1) $a<\frac{1}{4}$ 2) $a>\frac{1}{4}$ 3) $a=\frac{1}{4}$ 4) $a=-2$

56. If (a, b) is the mid point of the chord of the parabola $y^2 = 4ax$ passing through the vertex then

1) a=2b 2) 2a=b 3) $a^2 = 2b$ 4) $2a^2 = b^2$

57. A tangent to the parabola $y^2+4bx=0$ meets $y^2 = 4ax$ at P and Q. Then the locus of mid point of chord PQ is

1) $y^2(a+2b)=4a^2x$ 2) $y^2(2a+b)=2a^2x$

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

58. Locus of mid points of the chords of the parabola $y^2 = 4ax$ which touch the circle $x^2+y^2=a^2$ is

1) $(y^2-2ax)^2 = a^4(y^2+4a^2)$

2) $(y^2-2ax)^2 = a^2(y^2+4a^2)$

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

4) $(y^2-2ax)^2 = 4a^2(y^2+4a^2)$

59. Locus of mid points of chords of the parabola $y^2 = 4ax$ parallel to the line $lx+my+n=0$ is

1) $2ly+am=0$ 2) $ly+4am=0$

3) $ly+3am=0$ 4) $ly+2am=0$

60. The polar of a point w.r.to $y^2 = 4ax$ touches $x^2+4by=0$. Then the locus of poles is

1) xy=2ab 2) 4xy=ab 3) xy=ab 4) 3xy=ab

61. The triangle formed by the latusrectum of a parabola and the tangents drawn at the ends of latusrectum is always

1) equilateral 2) isosceles
3) right angled 4) right angled isosceles

62. The locus of mid points of parallel chords of a parabola is

1) the axis
2) a line parallel to the axis
3) a line parallel to directrix
4) a focal chord

63. The locus of mid points of chords of the parabola $y^2 = 4ax$ passing through the foot of the directrix is

1) $y^2 = a(x+a)$ 2) $y^2 = 2a(x+a)$

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

64. If the segment intercepted by the parabola $y^2 = 4ax$ with the line $lx+my+n=0$ subtends a right angle at the vertex then

1) $4al+n=0$ 2) $4al+4am+n=0$
3) $4am+n=0$ 4) $al+n=0$

65. A normal chord of the parabola $y^2 = 4x$ makes an angle 45^0 with the axis of the parabola. Then its length is

1) $8\sqrt{2}$ 2) $10\sqrt{2}$ 3) $6\sqrt{3}$ 4) $4\sqrt{3}$

66. The normal at (a, 2a) on $y^2 = 4ax$ meets the curve again at $(at^2, 2at)$. Then the value of t is equal to

1) 1 2) 3 3) -1 4) -3

67. The circumcircle of the triangle formed by any three tangents to a parabola passes through

1) vertex
2) the ends of latusrectum
3) the focus
4) the mid point of focus and vertex

68. If a tangent is drawn to the parabola $y^2 = 4x$ through (-2, 1) then the point of contact is

1) (2, 1) 2) (1, 2) 3) (1, -2) 4) $(2, \sqrt{2})$

69. The radical centre of the circles drawn on the focal chords of the parabola $y^2 = 4ax$ as diameters is

1) (-a, 0) 2) (a, 0) 3) (0, 0) 4) (a, a)

70. The locus of point of intersection of two tangents

to $y^2 = 4ax$ at t and 2t on the parabola is

1. $2y^2 = 9ax$ 2. $4y^2 = 9ax$

3. $3y^2 = 4ax$ 4. $3y^2 = 8ax$

71. The area of triangle formed by the tangents at the points 't_1''t_2''t_3' on $y^2 = 4ax$ is

1) $a^2\left|(t_1-t_2)(t_2-t_3)(t_3-t_1)\right|$

2) $2a^2\left|(t_1-t_2)(t_2-t_3)(t_3-t_1)\right|$

3) $\frac{a^2}{2}\left|(t_1-t_2)(t_2-t_3)(t_3-t_1)\right|$

4) $a^2\left|t_1t_2t_3\right|$

72. Two tangents to parabola $y^2 = 4ax$ have inclinations θ_1 and θ_2 with x-axis such that $\tan^2\theta_1 + \tan^2\theta_2 = k$ then the locus of the point of intersection is

1) $y = kx$ 2) $y^2 = kx^2 + 2ax$

3) $y^2 = 2ax$ 4) $y^2 = 2a$

73. The length of the chord intercepted by the parabola $y = x^2 + 3x$ on the line $x + y = 5$ is

1) $6\sqrt{2}$ 2) $2\sqrt{26}$ 3) $\sqrt{26}$ 4) $4\sqrt{26}$

K E Y

1. 2	2. 3	3. 3	4. 1	5. 1
6. 2	7. 1	8. 3	9. 3	10. 1
11. 3	12. 3	13. 3	14. 2	15. 3
16. 4	17. 1	18. 1	19. 4	20. 2
21. 2	22. 3	23. 3	24. 2	25. 4
26. 1	27. 2	28. 3	29. 3	30. 4
31. 2	32. 3	33. 3	34. 2	35. 1
36. 1	37. 4	38. 1	39. 1	40. 1
41. 4	42. 3	43. 2	44. 2	45. 2
46. 4	47.3	48. 3	49. 2	50. 3
51. 2	52. 1	53. 2	54. 2	55. 2
56. 4	57. 3	58. 2	59. 4	60. 1
61. 4	62. 2	63. 2	64. 1	65. 1
66. 4	67. 3	68. 3	69. 3	70. 1
71. 1	72. 2	73. 1		

HINTS

2. Select the equation of the parabola satisfying the vertex (2, 1).

5. Let $Q(x_1, y_1)$ be the mid point of $\overline{AP}$

Q $A = (-2, 0), P = (2x_1 + 2, 2y_1)$

P lies on $y^2 = 8x$ $4y_1^2 = 8(2x_1 + 2)$

$y^2 = 4(x+1)$ Focus = [-1 + 1, 0] = (0, 0)

7. Take the intersection point as one end of latusrectum of the given parabola.

8. Take the equation of the parabola in the form (perpendicular distance from p(x,y) to the axis)^2=(length of latusrectum)(perpendicular distance from p(x,y) to the tangent at the vertex)

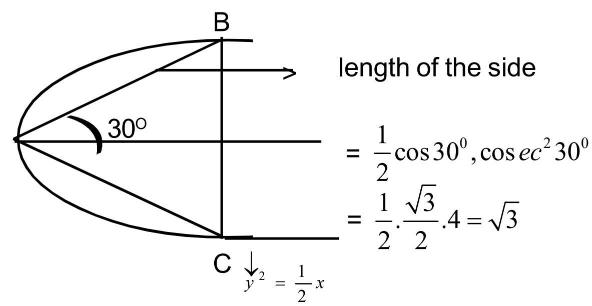
9. Select the vertex satisfying 2x-y-3=0, x+2y-4=0

13. Length of double ordinate is $4\sqrt{aK}$

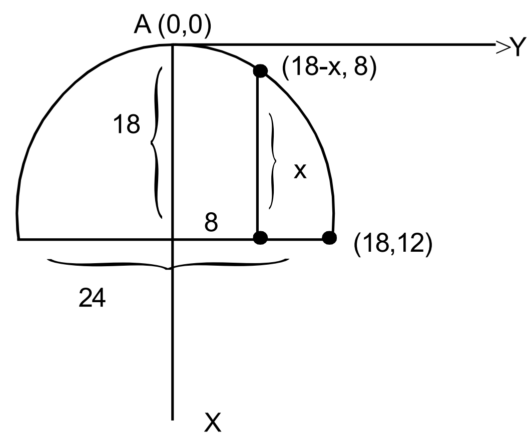
$a = \frac{1}{4}$ (length of latusrectum)

K = given distance

17.



18.



(18, 12) and (18-x, 8) lie on $y^2 = 4ax$

4a=8

64=8(18-x)

x=10

23. Equation of the parabola is of the form

$(l^2 + m^2)\left[(x-x_1)^2 + (y-y_1)^2\right] = (lx + my + n)^2$

Focus is (5, 3) directrix is 3x-4y+1=0

Hence axis is 4x+3y=20+9=29

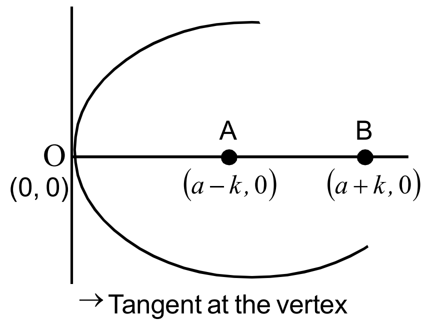
24. Arrange the equation in the form

$$34\left[(x-0)^2+(y-0)^2\right]=\left(\frac{1}{2}\right)^2(5x+3y+7)^2$$

$$l=de=\frac{7}{\sqrt{34}}\times\frac{1}{2} \qquad 2l=\frac{7}{\sqrt{34}}$$

29. On observation the given points are collinear. Hence number of parabolas = 0

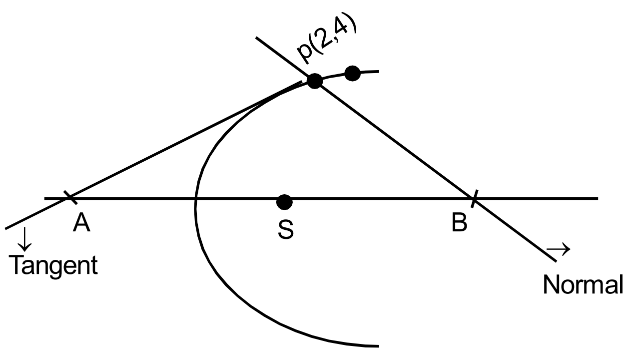
30.



AO = a - k
BO = a + k

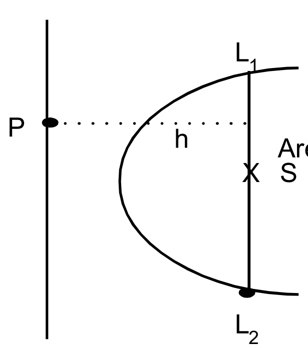
$$BO^2-AO^2=(a+k)^2-(a-k)^2=4ak$$

32.



SA = SP = SB
SP=2+2=4
AB is the diameter of the circle through A, P, B and S is centre. $\therefore \overline{AB}=8$

33.



Area $=\frac{1}{2}.L_1L_2.h=\frac{1}{2}.12.6=36$

40. $\sec^2\theta_1\sec^2\theta_2=\frac{1}{k^2}$

$$\left(1+\tan^2\theta_1\right)\left(1+\tan^2\theta_2\right)=\frac{1}{k^2}$$

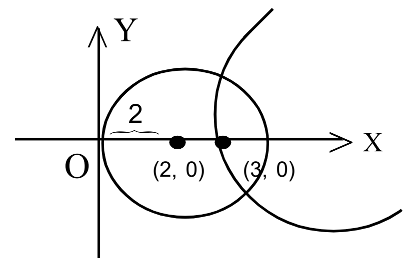
$$\left[1+\left(\tan\theta_1+\tan\theta_2\right)^2-2\tan\theta_1\tan\theta_2+\tan^2\theta_1\tan^2\theta_2\right]=\frac{1}{k^2}$$

$$\left[1+\frac{y_1^2}{x_1^2}-\frac{2a}{x_1}+\frac{a^2}{x^2}\right]=\frac{1}{k^2}$$

$$k^2\left[(x_1-a)^2+y_1^2\right]=x_1^2$$

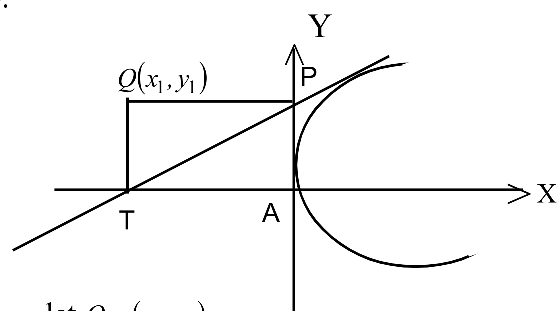
equation to locus is $x^2=k^2\left[(x-a)^2+y^2\right]$

43.



Points of intersection = 2

46.



let $Q=(x_1,y_1)$

equation of the line TP is $\frac{x}{x_1}+\frac{y}{y_1}=1$

$$xy_1+yx_1-x_1y_1=0$$

This is a tangent to $y^2=4ax$

condition of tangency

$$am^2=1n\Rightarrow ax_1^2=y_1\times -x_1y_1$$

equation to locus $y^2+ax=0$

50. Select the equation satisfying the points (1,7) and (4,8).

53. let (x_1,y_1) be the pole

polar of (x_1,y_1) w.r.to $y^2=4x$ is $yy_1=2(x+x_1)$

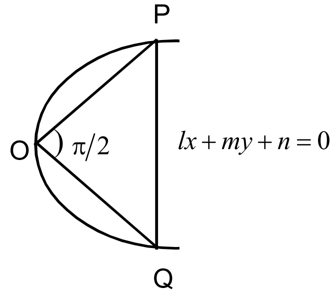
i.e., $2x-yy_1+2x_1=0$

This is a normal chord.

apply the condition of normal

$$al^3+2alm^2+m^2n=0$$

64.



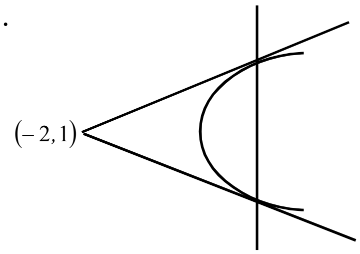
Combined equation of OP and OQ is

$y^2+4ax\left(\frac{lx+my}{+n}\right)=0$

Q $P\hat{O}Q=\frac{\pi}{2}$

$4al+n=0$

68.



Select the point satisfying the equation of chord of contact of (-2, 1) w.r.to $y^2=4x$

70. Select the equation satisfying the point $\left[2at^2,3at\right]$

LEVEL-3

1. Through the vertex O of the parabola $y^2=4ax$ a perpendicular is drawn to any tangent meeting at P and the parabola in Q. Then OP.OQ=
   1) a^2 2) $2a^2$ 3) $3a^2$ 4) $4a^2$
2. The length of the portion of the normal at (1, 1) to $x^2=y$ intercepted between the axes is
   1) $\frac{5\sqrt{3}}{2}$ 2) $\frac{3\sqrt{5}}{2}$ 3) $\frac{5\sqrt{3}}{4}$ 4) $\frac{3\sqrt{5}}{4}$
3. Three normals are drawn from the point (c, 0) to the parabola $y^2=x$. One normal is always x axis. If the other two normals are perpendicular then the value of c is
   1) $\frac{3}{5}$ 2) $\frac{2}{3}$ 3) $\frac{3}{4}$ 4) $\frac{5}{7}$
4. The normal at P(2, 4) to $y^2=8x$ meets the parabola at Q. Then the equation of the circle on normal chord PQ as diameter is
   1) $x^2+y^2-20x+8y-12=0$
   2) $x^2+y^2-10x+4y-8=0$
   3) $x^2+y^2-12x+6y-15=0$
   4) $x^2+y^2-10x+8y-12=0$
5. PQ is a normal chord of the parabola $y^2=4ax$ at $P\left(at^2,2at\right)$. Then the axis of the parabola divides $\overline{PQ}$ in the ratio
   1) $\frac{t^2}{t^2+2}$ 2) $\frac{t^2}{t^2-2}$ 3) $\frac{2t^2}{t^2-2}$ 4) $\frac{t^2}{2\left(t^2-2\right)}$
6. S is the focus of the parabola $y^2=8x$. P is a point on the parabola. The normal at P meets the axis in G. If SPG is an equilateral triangle then P is
   1) $\left(6,4\sqrt{3}\right)$ 2) $(8,8)$ 3) $\left(4,4\sqrt{2}\right)$ 4) $\left(3,2\sqrt{3}\right)$
7. If the common tangent to the parabola $y^2=4ax$ and the circle $x^2+y^2=c^2$ makes an angle θ with x axis then $\tan^2\theta=$
   1) $-\frac{1}{2}-\frac{\sqrt{c^2+4a^2}}{2c}$ 2) $-\frac{1}{2}+\frac{\sqrt{c^2+4a^2}}{2c}$
   3) $-\frac{1}{4}+\frac{\sqrt{c^2+4a^2}}{2c}$ 4) $-\frac{1}{4}-\frac{\sqrt{c^2+4a^2}}{2c}$
8. The locus of point of intersection of the two tangents to the parabola $y^2=4ax$ which intercept a given distance 4c on the tangent at the vertex is
   1) $y^2-4ax=\frac{c^2}{4}$ 2) $y^2-4ax=8c^2$
   3) $y^2-4ax=\frac{c^2}{2}$ 4) $y^2-4ax=16c^2$
9. Through the vertex A of the parabola $y^2=4ax$ chords AP and AQ are drawn at right angles to one another. Then the line PQ meets the axis in a fixed point with coordinates
   1) (3a, 0) 2) (2a, 0) 3) (6a, 0) 4) (4a, 0)
10. Through the vertex O of the parabola $y^2=4ax$ chords OP, OQ are drawn at right angles to each other. If the locus of mid points of these chords is a parabola then its vertex is
    1) (4a, 0) 2) (2a, 0) 3) (a, 0) 4) (3a, 0)
11. P is a point on the line $lx+my+n=0$. The polar of P w.r.to the parabola $y^2=4ax$ meets the curve in Q and R. Then the locus of mid point of QR is
    1) $l\left(y^2-4ax\right)+2a\left(lx+my+n\right)=0$
    2) $l\left(y^2-4ax\right)+4a\left(mx+ly+n\right)=0$

3) $l\left(y^2-2ax\right)+a\left(lx+my+n\right)=0$

4) $l\left(y^2-2ax\right)+8a\left(lx+my+n\right)=0$

12. The locus of mid points of normal chords of the parabola $y^2=4ax$ is

1) $\frac{y^3}{2a}+\frac{4a^3}{y^2}=x+2a$ 2) $\frac{y^2}{2a}+\frac{4a^3}{y^2}=x-2a$

3) $\frac{y^2}{2a}-\frac{4a^3}{y^2}=x+2a$ 4) $\frac{y^2}{2a}-\frac{4a^3}{y^2}=x-2a$

13. A variable chord PQ of the parabola $y^2=4ax$ is drawn parallel to y=x. Then the locus of point of intersection of normals at P and Q is

1) $2x-y-12a=0$ 2) $2x-y+10a=0$

3) $2x-y-8a=0$ 4) $2x-y+6a=0$

14. Three normals are drawn from P to the parabola $y^2=4ax$. If two normals make complimentary angles with the axis then the equation to the locus of P is

1) $y^2=a(x-3a)$ 2) $y^2=a(x-2a)$

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

15. A is a point on $y^2=4ax$. The normal at A meets the parabola again at B. If AB subtends a right angle at its vertex then the slope of AB is

1) $\frac{1}{2}$ 2) $\frac{-1}{2}$ 3) $\sqrt{2}$ 4) $\frac{2}{3}$

16. The locus of point of intersection of two normals drawn to the parabola $y^2=4ax$ which are at right angles is

1) $y^2=a(x-3a)$ 2) $y^2=a(x-a)$

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

KEY

1. 4	2. 2	3. 3	4. 1	5. 1
6. 1	7. 2	8. 4	9. 4	10. 1
11. 1	12. 2	13. 1	14. 4	15. 3
16. 1				

NPQ: PARABOLA

1. For the given curve $y^2=8x$

I. Length of the latus rectum 8

II. Focal distance to the point (2,4) is 4

III. One of the points on the curve is (2,-4)

Which of the above statements are correct

1) Only I and III 2) Only II and III

3) Only I and II 4) All the three

2. If $y^2=4ax$ represents a parabola, then

I. If $\overline{PQ}$ is a focal chord then $y_1y_2=4a^2$ where $P=(x_1,y_1)$ and $Q=(x_2,y_2)$

II. The line $\overline{PQ}$ where $P\left(at_1^2,2at_1\right)$ and $Q\left(at_2^2,2at_2\right)$ represents a focal chord then $t_1t_2=-1$

Which of the following statements ic correct

1) Only I 2) Only II

3) Both I and II 4) Neither I nor II

3. A: If (9,12) is one end of a focal chord of the parabola $y^2=16x$ then the slope of it is

B: The parabola $x^2=py$ passes through $(12,16)$. The focal distance of the point

C: If the parabola $y^2=kx$ passes through (9,6) then the value of 'k'

D: The Ordinate of the point on the parabola $y^2=36x$ which ordinate is three times its abscissa is

write ascending order of the value of the above statements in the decending order

1) B,D,C,A 2) B,D,A,C

3) D,B,C,A 4) A,B,C,D

4. The successive values of the statements given below in that order are

A: If θ is the angle between the two tangents to $y^2=12x$ from the points $(1,4)$ then $\tan\theta=$

B: P (-3,2) is one end of focal chord $\overline{PQ}$ of the parabola $y^2+4x+4y=0$ then the slope of the normal at Q is.

C: If $(2,4)$ and $(P,6)$ are conjugate points with respect to $y^2=16x$ then the value of p is

D: Ordinate of the pole of the line $x-2y+3=0$ with respect to $y^2=4x$ is

1) $-\frac{1}{2},\frac{1}{2},1,4$ 2) $\frac{1}{2},-\frac{1}{2},1,4$

3) $4,1\frac{1}{2},-\frac{1}{2}$ 4) $\frac{1}{2},-\frac{1}{2},4,1$

5. Observe the following lists:

List I	List - II
A. $y=\sqrt{x}$ represents	1. $b-2ax=0$
B. If $2x+y+a=0$ is a focal chord of the parabola $y^2=-8x$ then a =	2. $\frac{\pi}{2}$
C. The angle subtended by the double ordinate of the length of the parabola $y^2=8x$ at its vertex is	3. Semi parabola
D. The axis of the symmetry of the conic $y=ax^2+bx+c$ is	4. 4
	5. $b+2ax=0$

The correct Match for List I from List II is:

	A	*B*	*C*	*D*
1.	3	4	5	2
2.	3	1	5	2
3.	3	4	1	2
4.	3	4	2	5

6. Observe the following Lists:

List - I	List - II
A. If the parabola $y^2=4ax$ passes through $(-3,2)$ then the length of the latus rectum is	1. Parabola
B. The equation $\frac{x}{y}+\frac{4}{x}=0$ represents	2. $2x-9=0$
C. If the parabola $y^2=4ax$ passes through $(2,-6)$ then the equation of the latus rectum is	3. $x-2y+1=0$
D. Equation of the tangent to $x^2-4x-8y+12=0$ at $(4,3/2)$ is	4. ellipse
	5. $\frac{4}{3}$

Correct matching of List I from List II items

	A	*B*	*C*	*D*
1.	5	1	3	2
2.	5	1	2	3
3.	5	1	4	3
4.	1	2	3	4

7. Observe the following Lists:

List - I	List - II
A. Length of the latus rectum of the parabola $3y^2=-4x$	1. $(5,2)$
B. Equation of the parabola whose focus $(0,4)$ and directrix $x+4=0$ is	2. $\frac{-4}{3}$
C. The focus of the parabola $(y-2)^2=8(x-3)$ is	3. $\frac{4}{3}$
D. Equation of the parabola whose vertex $(-1,-2)$ latus rectum 4 and axis is parallel to y-axis	4. $(x+1)^2=4(y+2)$
	5. $x^2=16y$

The correct match for List I from List II

	A	*B*	*C*	*D*
1.	3	5	1	4
2.	3	5	4	1
3.	3	2	1	4
4.	1	2	3	4

8. Assertion (A) : If the line $x-3y+k=0$ touches the parabola $3y^2=4x$ then k = 5

Reason (R): Equation of the tangent to $y^2=8x$ inclined at an angle 30^0 to the axis is

$x-\sqrt{3}y+6=0$

1) both A and R are true and R is the correct explanation of A
2) Both A and R are true and R is not correct explanation of A
3) A is true but R is false
4) A is false but R is True

9. At any point on the parabola $y^2=4ax$

I: Length of the subtangent is twice the abscissa which of the above statements ic correct?

II: Length of the subnormal is 4a.

Which of the above statements is correct?

1) Only I 2) only II
3) Both I and II 4) neither I nor II

10. I. Common tangent to the parabolas $y^2=32x$ and $x^2=108y$ is $2x+3y+36=0$

II: Common tangent to the parabolas $y^2=32x$ and $x^2=-108y$ is $2x-3y+36=0$

Which of the above statements is correct?

1) only I 2) only II
3) Both I and II 4) neither I nor II

11. I. If the line $x\cos\theta+y\sin\theta=3$ touches $y^2=8x$ then $\theta=120^0$

II. If the line $x+y+k=0$ touches $y^2=4x$ then k = 1.

Which of the above statements is correct?

1) only I 2) only II
3) both I and II 4) neither I nor II

12. The arrangement of the following parabolas in the ascending order of their latusrecta

A). $y=4x^2+x+1$ B) $2y=x^2+x+5$

C) $x=2y^2+y+3$ D) $y^2+x+y+9=0$

1) B,D,C,A 2) A,B,C,D
3) A,C,D,B. 4) A,D,C,B

13. Arrange the following numbers in ascending order for the parabola $y^2=16x$

A. Length of the tangent from (1,5)
B. Focal distance of (1,4)
C. Number of tangents from (1,5)
D. Number of tangents from (1,3)

1) B,A,C,D 2) D,C,A,B
3) A,C,D,B 4) D,C,B,A

14. For the parabola $x^2=8y$, $y=2x+A$ $y=x+B$, $y=3x+C$, $y=-4x+D$ are the tangents then the arrangement of A,B,C,D in the decending order is

1) A,B,C,D 2) C,B,A,D
3) B,A,C,D 4) C,A,D,B

15. α,β are the angles made by the tangents with the axis of the parabola drawn from the point "P" to the paraboala $y^2=4ax$

List - I	**List - II**
A. $\cot\alpha\cot\beta=k$, locus of P is	1. $kx=a$
B. $\tan\alpha+\tan\beta=k$, locus of P is	2. $y=k(x-a)$
C. $\tan(\alpha+\beta)=k$, locus of P is	3. $kx=y$
D. $\tan\alpha\tan\beta=k$, locus of P is	4. $xy=k$
	5. $x=ka$

The correct match for List - I from List - II

	A	*B*	*C*	*D*
1.	5	3	2	1
2.	3	2	1	5
3.	1	3	2	4
4.	4	2	1	5

16. Observe the following Lists

List - I **List - II**

Locus of foot of the perpendicular from focus to any tangent
to the following parabolas

A: $y^2=8x$	1. y+3 = 0
B. $x^2+2y=0$	2. x = 0
C. $y^2+2x-4=0$	3. x - 2 = 0
D. $x^2-3y-9=0$	4. y = 0
	5. x + y = 0

The correct match for List - I from List - II is

	A	*B*	*C*	*D*
1.	2	4	3	1
2.	3	5	4	1
3.	3	4	5	1
4.	1	4	5	3

17. Assertion A: Orthocentre of the triangle formed by any three tangents to the parabola lies on the directrix of the parabola.
Reason R: The orthocentre of the triangle formed by the tangents at t_1, t_2, t_3 to the parabola $y^2 = 4ax$ is $\left(-a, a\left(t_1+t_2+t_3+t_1t_2t_3\right)\right)$
1) Both A and R are true and R is the correct explanation of A
2) Both A and R are true and R is not the correct explanation of A
3) A is true but R is false
4) A is false but R is true

18. Assertion A: The least length of the focal chord of $y^2 = 4ax$ is 4a
Reason R: Length of the focal chord of $y^2 = 4ax$ makes an angle θ with its axis is $4a\operatorname{cosec}^2\theta$
1) Both A and R are true and R is the correct explanation of A
2) Both A and R are true and R is not the correct explanation of A
3.) A is true but R is false 4) A is false but R is true

KEY

1) 4	2) 2	3) 3	4) 2	5) 4
6) 2	7)1	8) 4	9) 1	10) 3
11) 3	12) 3	13) 4	14) 3	15) 1
16) 1	17) 1	18) 1		

PREVIOUS EAMCET EXAMINATIONS

2005

1. The parabola with directrix $x+2y-1=0$ and focus (1,0) is
1) $4x^2-4xy+y^2-8x+4y+4=0$
2) $4x^2+4xy+y^2-8x+4y+4=0$
3) $4x^2+4xy+y^2+8x-4y+4=0$
4) $4x^2-4xy+y^2-8x-4y+4=0$

2004

2. The line among the following that touches the parabola $y^2=4ax$ is
1) $x+my-am^2=0$ 2) $x-my+am^2=0$
3) $x+my-am^2=0$ 4) $y+mx+am^2=0$

2003

3. The equation of the parabola with focus (0,0) and directrix $x+y=4$ is
1) $x^2+y^2-2xy+8x+8y-16=0$
2) $x^2+y^2-2xy+8x+8y=0$
3) $x^2+y^2+8x+8y-16=0$
4) $x^2-y^2+8x+8y-16=0$

2002

4. A variable circle passes through the fixed point (2, 0) and touches the y axis. Then the locus of its centre is
1) a parabola 2) a circle
3) an ellipse 4) a hyperbola

5. Equation of the parabola with focus (3, 0) and the directrix x+3=0 is
1) $y^2=3x$ 2) $y^2=6x$ 3) $y^2=12x$ 4) $y^2=2x$

6. Locus of the poles of focal chords of a parabola is .... of the parabola
1) the axis 2) a focal chord
3) the directrix
4) the tangent at the vertex

2001

7. The length of latusrectum of the parabola $y^2+8x-2y+17=0$ is
1) 2 2) 4 3) 8 4) 16

8. If the normal to the parabola $y^2=4x$ at P(1, 2) meets the parabola again in Q then Q =
1) (-6, 9) 2) (9, -6)
3) (-9, -6) 4) (-6, -9)

9. The equation $16x^2+y^2+8xy-74x-78y+212=0$ represents
1) a circle 2) a parabola
3) an ellipse 4) a hyperbola

2000

10. The vertex of the parabola $x^2+8x+12y+4=0$ is
1) (-4, 1) 2) (4, -1) 3) (-4, -1) 4) (4, 1)

11. The line 4x+6y+9=0 touches the parabola $y^2=4x$ at the point
1) $\left(-3,\frac{9}{4}\right)$ 2) $\left(3,\frac{-9}{4}\right)$
3) $\left(\frac{9}{4},-3\right)$ 4) $\left(\frac{-9}{4},-3\right)$

1999

12. Vertex of the parabola $x^2+12x-9y=0$ is
1) (6, -4) 2) (-6, 4) 3) (6, 4) 4) (-6, -4)

13. If 2y=5x+k is a tangent to the parabola $y^2 = 6x$ then k =

1) $\frac{2}{5}$ 2) $\frac{3}{5}$ 3) $\frac{4}{5}$ 4) $\frac{6}{5}$

14. The focus of the parabola $y^2 - 4y - 8x - 4 = 0$ is

1) (1, 1) 2) (1, 2) 3) (2, 0) 4) (2, 2)

1998

15. The pole of the line 2x+3y-4=0 w.r.to the parabola $y^2 = 4x$ is

1) (2, 3) 2) (-2, -3) 3) (1, 1) 4) (2, -3)

16. Equation of the directrix of the parabola $y^2 - 2x - 6y - 5 = 0$ is

1) 2x+15=0 2) x+5=0 3) 2x+3=0 4) x+2=0

1997

17. If x+y+1=0 touches the parabola $y^2 = kx$ then the value of k is

1) -4 2) 4 3) 3 4) -3

18. If the normal at t_1 on the parabola $y^2 = 4ax$ meets it again at t_2 then $t_2 =$

1) $t_1 + \frac{2}{t_1}$ 2) $-t_1 - \frac{2}{t_1}$ 3) $t_1 - \frac{2}{t_1}$ 4) $-t_1 + \frac{2}{t_1}$

1996

19. Axis of the parabola $x^2 - 3y - 6x + 6 = 0$ is

1) x=-3 2) y=-1 3) x=3 4) y=1

20. The equation of the chord of $y^2 = 6x$ with mid point at (-1, 1) is

1) y-3x=4 2) y-3x+4=0
3) 3x-y=0 4) 3x-y-1=0

21. The point of contact of the line 2x-y+2=0 with the parabola $y^2 = 16x$ is

1. (2, 4) 2. (3, 4) 3. (1, 4) 4. (-2,1)

1995

22. The tangents to the parabola $y^2 = 4ax$ at t_1 and t_2 intersects on its axis then

1) $t_1 = t_2$ 2) $t_1 = -t_2$ 3) $t_1t_2 = 2$ 4) $t_1t_2 = -1$

23. If the polar w.r.to the circle $x^2 + y^2 = r^2$ touches the parabola $y^2 = 4ax$ the locus of the pole is

1) $y^2 = \frac{-r^2}{a}x$ 2) $x^2 = \frac{-r^2}{a}y$

3) $y^2 = \frac{r^2}{a}x$ 4) $x^2 = \frac{r^2}{a}y$

24. Combined equation of pair of tangents to the parabola $y^2 = 4ax$ from an external point $A(x_1, y_1)$ is

1) $(y^2 - 4ax)(y_1^2 - 4ax_1) = (yy_1 - 2ax - 2ax_1)^2$

2) $y^2 - 4ax = (yy_1 - 2ax - 2ax_1)^2$

3) $y^2 - 4ax = (yy_1 - 2ax_1)^2$ 4) None of these

25. If PSP' is a focal chord of the parabola $y^2 = 4ax$ and SL is its semilatusrectum then SP, SL, SP' are in

1) AP 2) HP 3) GP 4) None

1994

26. The tangents at the points $(at_1^2, 2at_1)$ $(at_2^2, 2at_2)$ on the parabola $y^2 = 4ax$ are at right angles then

1) $t_1t_2 = -1$ 2) $t_1t_2 = 1$ 3) $t_1t_2 = 2$ 4) $t_1t_2 = -2$

1993

27. The focus of the parabola $y^2 - x - 2y + 2 = 0$ is

1) $\left(\frac{1}{4}, 0\right)$ 2) (1, 2) 3) $\left(\frac{3}{4}, \frac{1}{4}\right)$ 4) $\left(\frac{5}{4}, 1\right)$

28. The parabola $(y+1)^2 = a(x-2)$ passes through (1, -2). Then the equation of directrix is

1) 4x+1=0 2) 4x-1=0 3) 4x+9=0 4) 4x-9=0

1992

29. Two tangents are drawn from the point (-2, -1) to the parabola $y^2 = 4x$. If α is the angle between these tangents then $\tan\alpha =$

1) 3 2) $\frac{1}{3}$ 3) 2 4) $\frac{1}{2}$

30. An arch is in the shape of a parabola whose axis is vertically downward and measures 80 meters across the bottom on the ground. Its highest point is 24 meters. Then the measure of the horizontal beam across the section at a height of 18 meters is

1) 55 2) 50 3) 45 4) 40

1991

31. Equation of the common tangent to the circle $x^2 + y^2 = 2a^2$ and the parabola $y^2 = 8ax$ is

1) $y = \pm(x + 2a)$ 2) $y = \pm(x - 2a)$

3) $y = \pm(x + a)$ 4) $y = \pm(x - a)$

32. On the parabola $y^2 = 8x$ if one extremity of a focal chord is $\left(\frac{1}{2}, -2\right)$ then its other extremity is

1) $(2,2)$ 2) $\left(\frac{1}{8}, -8\right)$ 3) $\left(8, \frac{1}{8}\right)$ 4) $(8,8)$

33. The graph represented by the equation $x = \sin^2 t$, $y = 2\cos t$ is

1) a portion of a parabola 2) a parabola
3) a part of sine graph 4) a part of hyperbola

Eamcet-2007

34. For the Parabola $y^2 + 6y - 2x + 5 = 0$

I) The vertex is (-2, -3)

II) The directrix is y + 3 = 0

Which of the follwoing is correct ? **E-2007**

1) Both I and II are true 2) I is true, II is false
3) I is false, II is true 4) Both I and II are false

KEY

1. 1	2.2	3.1	4. 1	5. 3	6. 3
7. 3	8. 2	9. 2	10. 1	11. 3	12.4
13. 4	14. 2	15. 2	16. 1	17. 2	18.2
19. 3	20. 1	21. 3	22. 2	23. 1	24.1
25. 2	26. 1	27. 4	28. 4	29. 1	30.4
31. 1	32. 4	33. 2	34. 2		