Assignment

Conic Section: General

Basic Level

1. The equation $2x^2 + 3y^2 - 8x - 18y + 35 = k$ represents **[IIT Screening 1994]**

(a) No locus, if $k > 0$ (b) An ellipse, if $k < 0$ (c) A point, if $k = 0$ (d) A hyperbola, if $k > 0$

2. The equation $14x^2 - 4xy + 11y^2 - 44x - 58y + 71 = 0$ represents **[BIT 1986]**

(a) A circle (b) An ellipse (c) A hyperbola (d) A rectangular hyperbola

3. Eccentricity of the parabola $x^2 - 4x - 4y + 4 = 0$ is **[Rajasthan PET 1996]**

(a) $e = 0$ (b) $e = 1$ (c) $e > 4$ (d) $e = 4$

4. $x^2 - 4y^2 - 2x + 16y - 40 = 0$ represents **[DCE 1999]**

(a) A pair of straight lines (b) An ellipse (c) A hyperbola (d) A parabola

5. The centre of the conic represented by the equation $2x^2 - 72xy + 23y^2 - 4x - 28y - 48 = 0$ is

(a) $\left(\frac{11}{15}, \frac{2}{25}\right)$ (b) $\left(\frac{2}{25}, \frac{11}{25}\right)$ (c) $\left(\frac{11}{25}, -\frac{2}{25}\right)$ (d) $\left(-\frac{11}{25}, -\frac{2}{25}\right)$

Definition, Standard Equation of Parabola and Terms related to Parabola

Basic Level

6. The equation of the parabola with focus (a, b) and directrix $\frac{x}{a} + \frac{y}{b} = 1$ is given by **[MP PET 1997]**

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

(c) $(ax - by)^2 + a^4 + b^4 - 2a^3x = 0$ (d) $(ax - by)^2 - 2a^3x = 0$

7. The equation of the parabola with focus $(3, 0)$ and the directrix $x + 3 = 0$ is **[EAMCET 2002]**

(a) $y^2 = 3x$ (b) $y^2 = 2x$ (c) $y^2 = 12x$ (d) $y^2 = 6x$

8. The parabola $y^2 = x$ is symmetric about **[Kerala (Engg.) 2002]**

(a) x-axis (b) y-axis (c) Both x-axis and y-axis (d) The line $y = x$

9. The focal distance of a point on the parabola $y^2 = 16x$ whose ordinate is twice the abscissa, is

(a) 6 (b) 8 (c) 10 (d) 12

10. The points on the parabola $y^2 = 12x$, whose focal distance is 4, are

(a) $(2, \sqrt{3}), (2, -\sqrt{3})$ (b) $(1, 2\sqrt{3}), (1, -2\sqrt{3})$ (c) $(1, 2)$ (d) None of these

11. The coordinates of the extremities of the latus rectum of the parabola $5y^2 = 4x$ are

(a) $(1/5, 2/5); (-1/5, 2/5)$ (b) $(1/5, 2/5); (1/5, -2/5)$ (c) $(1/5, 4/5); (1/5, -4/5)$ (d) None of these

12. If the vertex of a parabola be at origin and directrix be $x + 5 = 0$, then its latus rectum is **[Rajasthan PET 1991]**

(a) 5 (b) 10 (c) 20 (d) 40

13. The equation of the lines joining the vertex of the parabola $y^2 = 6x$ to the points on it whose abscissa is 24, is

(a) $y \pm 2x = 0$ (b) $2y \pm x = 0$ (c) $x \pm 2y = 0$ (d) $2x \pm y = 0$

14. PQ is a double ordinate of the parabola $y^2 = 4ax$. The locus of the points of trisection of PQ is

(a) $9y^2 = 4ax$ (b) $9x^2 = 4ay$ (c) $9y^2 + 4ax = 0$ (d) $9x^2 + 4ay = 0$

15. The equation of a parabola is $25\{(x-2)^2+(y+5)^2\} = (3x+4y-1)^2$. For this parabola

(a) Vertex $= (2,-5)$ (b) Focus $= (2,-5)$

(c) Directrix has the equation $3x+4y-1=0$ (d) Axis has the equation $3x+4y-1=0$

16. The co-ordinates of a point on the parabola $y^2 = 8x$, whose focal distance is 4, is

(a) $(2, 4)$ (b) $(4, 2)$ (c) $(2, -4)$ (d) $(4, -2)$

17. The equation of the parabola with $(-3, 0)$ as focus and $x + 5 = 0$ as directrix, is **[Rajasthan PET 1985, 86, 89; MP PET 1991]**

(a) $x^2 = 4(y+4)$ (b) $x^2 = 4(y-4)$ (c) $y^2 = 4(x+4)$ (d) $y^2 = 4(x-4)$

Advance Level

18. A double ordinate of the parabola $y^2 = 8px$ is of length $16p$. The angle subtended by it at the vertex of the parabola is

(a) $\frac{\pi}{4}$ (b) $\frac{\pi}{2}$ (c) $\frac{\pi}{3}$ (d) None of these

19. If $(2,-8)$ is at an end of a focal chord of the parabola $y^2 = 32x$; then the other end of the chord is

(a) $(32, 32)$ (b) $(32, -32)$ (c) $(-2, 8)$ (d) None of these

20. A square has one vertex at the vertex of the parabola $y^2 = 4ax$ and the diagonal through the vertex lies along the axis of the parabola. If the ends of the other diagonal lie on the parabola, the co-ordinates of the vertices of the square are

(a) $(4a, 4a)$ (b) $(4a, -4a)$ (c) $(0, 0)$ (d) $(8a, 0)$

Other standard forms of Parabola

Basic Level

21. A parabola passing through the point (–4,–2) has its vertex at the origin and y-axis as its axis. The latus rectum of the parabola is

(a) 6 (b) 8 (c) 10 (d) 12

22. The focus of the parabola $x^2 = -16y$ is **[Rajasthan PET 1987; MP PET 1988, 1992]**

(a) (4, 0) (b) (0, 4) (c) (– 4, 0) (d) (0, – 4)

23. The end points of latus rectum of the parabola $x^2 = 4ay$ are **[Rajasthan PET 1997]**

(a) $(a, 2a), (2a, -a)$ (b) $(-a, 2a), (2a, a)$ (c) $(a, -2a), (2a, a)$ (d) $(-2a, a), (2a, a)$

24. The ends of latus rectum of parabola $x^2 + 8y = 0$ are **[MP PET 1995]**

(a) (–4, –2) and (4, 2) (b) (4, –2) and (–4, 2) (c) (–4, –2) and (4, –2) (d) (4, 2) and (–4, 2)

25. Given the two ends of the latus rectum, the maximum number of parabolas that can be drawn is

(a) 1 (b) 2 (c) 0 (d) Infinite

26. The length of the latus rectum of the parabola $9x^2 - 6x + 36y + 19 = 0$ is **[MP PET 1994]**

(a) 36 (b) 9 (c) 6 (d) 4

Special form of Parabola

Basic Level

27. Vertex of the parabola $y^2 + 2y + x = 0$ lies in the quadrant **[MP PET 1989]**

(a) First (b) Second (c) Third (d) Fourth

28. The vertex of the parabola $3x - 2y^2 - 4y + 7 = 0$ is **[Rajasthan PET 1996]**

(a) (3, 1) (b) (–3, –1) (c) (–3, 1) (d) None of these

29. The vertex of parabola $(y-2)^2 = 16(x-1)$ is **[Karnataka CET 2001]**

(a) (2, 1) (b) (1, –2) (c) (–1, 2) (d) (1, 2)

30. The vertex of the parabola $x^2 + 8x + 12y + 4 = 0$ is **[DCE 1999]**

(a) (–4, 1) (b) (4, –1) (c) (–4, –1) (d) (4, 1)

31. The axis of the parabola $9y^2 - 16x - 12y - 57 = 0$ is **[MNR 1995]**

(a) $3y = 2$ (b) $x + 3y = 3$ (c) $2x = 3$ (d) $y = 3$

32. The directrix of the parabola $x^2 - 4x - 8y + 12 = 0$ is **[Karnataka CET 2003]**

(a) $x = 1$ (b) $y = 0$ (c) $x = -1$ (d) $y = -1$

33. The length of the latus rectum of the parabola $x^2 - 4x - 8y + 12 = 0$ is **[MP PET 2000]**

(a) 4 (b) 6 (c) 8 (d) 10

34. The latus rectum of the parabola $y^2 = 5x + 4y + 1$ is **[MP PET 1996]**

(a) $\frac{5}{4}$ (b) 10 (c) 5 (d) $\frac{5}{2}$

35. If (2, 0) is the vertex and y-axis the directrix of a parabola then its focus is **[MNR 1981]**

(a) (2, 0) (b) (–2, 0) (c) (4, 0) (d) (–4, 0)

36. The length of latus rectum of the parabola $4y^2 + 2x - 20y + 17 = 0$ is **[MP PET 1999]**

(a) 3 (b) 6 (c) $\frac{1}{2}$ (d) 9

37. The focus of the parabola $y^2 = 4y - 4x$ is **[MP PET 1991]**

(a) (0, 2) (b) (1, 2) (c) (2, 0) (d) (2, 1)

38. Focus of the parabola $(y-2)^2 = 20(x+3)$ is **[Karnataka CET 1999]**

(a) (3, –2) (b) (2, –3) (c) (2, 2) (d) (3, 3)

39. The focus of the parabola $y^2 - x - 2y + 2 = 0$ is **[UPSEAT 2000]**

(a) (1/4, 0) (b) (1, 2) (c) (3/4, 1) (d) (5/4, 1)

40. The focus of the parabola $y = 2x^2 + x$ is **[MP PET 2000]**

(a) (0, 0) (b) $\left(\frac{1}{2}, \frac{1}{4}\right)$ (c) $\left(-\frac{1}{4}, 0\right)$ (d) $\left(-\frac{1}{4}, \frac{1}{8}\right)$

41. The vertex of a parabola is the point (a, b) and latus rectum is of length l. If the axis of the parabola is along the positive direction of y-axis, then its equation is

(a) $(x+a)^2 = \frac{l}{2}(2y - 2b)$ (b) $(x-a)^2 = \frac{l}{2}(2y - 2b)$ (c) $(x+a)^2 = \frac{l}{4}(2y - 2b)$ (d) $(x-a)^2 = \frac{l}{8}(2y - 2b)$

42. $y^2 - 2x - 2y + 5 = 0$ represents **[Roorkee 1986, 95]**

(a) A circle whose centre is (1, 1) (b) A parabola whose focus is (1, 2)

(c) A parabola whose directrix is $x = \frac{3}{2}$ (d) A parabola whose directrix is $x = -\frac{1}{2}$

43. The length of the latus rectum of the parabola whose focus is (3, 3) and directrix is $3x - 4y - 2 = 0$ is **[UPSEAT 2001]**

(a) 2 (b) 1 (c) 4 (d) None of these

44. The equation of the parabola whose vertex is at (2, –1) and focus at (2, – 3) is **[Kerala (Engg.) 2002]**

(a) $x^2+4x-8y-12=0$ (b) $x^2-4x+8y+12=0$ (c) $x^2+8y=12$ (d) $x^2-4x+12=0$

45. The equation of the parabola with focus (0, 0) and directrix $x+y=4$ is **[EAMCET 2003]**

(a) $x^2+y^2-2xy+8x+8y-16=0$ (b) $x^2+y^2-2xy+8x+8y=0$

(c) $x^2+y^2+8x+8y-16=0$ (d) $x^2-y^2+8x+8y-16=0$

46. The equation of the parabola whose vertex and focus lies on the x-axis at distance a and a' from the origin, is **[Rajasthan PET 2000]**

(a) $y^2=4(a'-a)(x-a)$ (b) $y^2=4(a'-a)(x+a)$ (c) $y^2=4(a'+a)(x-a)$ (d) $y^2=4(a'+a)(x+a)$

47. The equation of parabola whose vertex and focus are (0, 4)and (0, 2) respectively, is **[Rajasthan PET 1987, 1989, 1990, 1991]**

(a) $y^2-8x=32$ (b) $y^2+8x=32$ (c) $x^2+8y=32$ (d) $x^2-8y=32$

48. The equation of the parabola, whose vertex is (–1, –2) axis is vertical and which passes through the point (3, 6)is

(a) $x^2+2x-2y-3=0$ (b) $2x^2=3y$ (c) $x^2-2x-y+3=0$ (d) None of these

49. The length of the latus rectum of the parabola whose focus is $\left(\frac{u^2}{2g}\sin 2\alpha, -\frac{u^2}{2g}\cos 2\alpha\right)$ and directrix is $y=\frac{u^2}{2g}$, is

(a) $\frac{u^2}{g}\cos^2\alpha$ (b) $\frac{u^2}{g}\cos 2\alpha$ (c) $\frac{2u^2}{g}\cos 2\alpha$ (d) $\frac{2u^2}{g}\cos^2\alpha$

50. The equation of the parabola whose axis is vertical and passes through the points (0, 0), (3, 0) and (–1, 4), is

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

51. If the vertex and the focus of a parabola are (–1, 1) and (2, 3) respectively, then the equation of the directrix is

(a) $3x+2y+14=0$ (b) $3x+2y-25=0$ (c) $2x-3y+10=0$ (d) None of these

52. If the focus of a parabola is (–2, 1) and the directrix has the equation $x+y=3$, then the vertex is

(a) (0, 3) (b) (–1, 1/2) (c) (–1, 2) (d) (2, –1)

53. The vertex of a parabola is (a, 0) and the directrix is $x+y=3a$. The equation of the parabola is

(a) $x^2+2xy+y^2+6ax+10ay+7a^2=0$ (b) $x^2-2xy+y^2+6ax+10ay=7a^2$

(c) $x^2-2xy+y^2-6ax+10ay=7a^2$ (d) None of these

54. The equation of a locus is $y^2+2ax+2by+c=0$, then

(a) It is an ellipse (b) It is a parabola (c) Its latus rectum =a (d) Its latus rectum= 2a

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

(a) –16 (b) –4 (c) 4 (d) 16

56. If the vertex of a parabola is the point (–3, 0) and the directrix is the line $x+5=0$ then its equation is

(a) $y^2=8(x+3)$ (b) $x^2=8(y+3)$ (c) $y^2=-8(x+3)$ (d) $y^2=8(x+5)$

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

(a) 2/3 (b) 4/3 (c) 1/3 (d) 4

58. The extremities of latus rectum of the parabola $(y-1)^2=2(x+2)$ are

(a) $\left(-\frac{3}{2}, 2\right)$ (b) $(-2, 1)$ (c) $\left(-\frac{3}{2}, 0\right)$ (d) $\left(-\frac{3}{2}, 1\right)$

59. The equation of parabola is given by $y^2+8x-12y+20=0$. Tick the correct options given below

(a) Vertex (2, 6) (b) Focus (0, 6) (c) Latus rectum $=4$ (d) axis $y=6$

Advance Level

60. The length of the latus rectum of the parabola $169\{(x-1)^2+(y-3)^2\}=(5x-12y+17)^2$ is

(a) $\frac{14}{13}$ (b) $\frac{28}{13}$ (c) $\frac{12}{13}$ (d) None of these

61. The length of the latus rectum of the parabola $x=ay^2+by+c$ is

(a) $\frac{a}{4}$ (b) $\frac{a}{3}$ (c) $\frac{1}{a}$ (d) $\frac{1}{4a}$

62. If the vertex = (2, 0) and the extremities of the latus rectum are (3, 2) and (3, –2), then the equation of the parabola is

(a) $y^2=2x-4$ (b) $x^2=4y-8$ (c) $y^2=4x-8$ (d) None of these

63. Let there be two parabolas with the same axis, focus of each being exterior to the other and the latus recta being $4a$ and $4b$. The locus of the middle points of the intercepts between the parabolas made on the lines parallel to the common axis is a

(a) Straight line if $a=b$ (b) Parabola if $a\neq b$ (c) Parabola for all a, b (d) None of these

64. A line L passing through the focus of the parabola $y^2=4(x-1)$ intersects the parabola in two distinct points. If 'm' be the slope of the line L, then

(a) $-1<m<1$ (b) $m<-1$ or $m>1$ (c) $m\in R$ (d) None of these

Parametric equations of Parabola

Basic Level

65. Which of the following points lie on the parabola $x^2=4ay$ **[Rajasthan PET 2002]**

(a) $x=at^2, y=2at$ (b) $x=2at, y=at$ (c) $x=2at^2, y=at$ (d) $x=2at, y=at^2$

66. The parametric equation of a parabola is $x=t^2+1, y=2t+1$. The cartesian equation of its directrix is

(a) $x=0$ (b) $x+1=0$ (c) $y=0$ (d) None of these

67. The parametric representation $(2+t^2, 2t+1)$ represents

(a) A parabola with focus at (2, 1) (b) A parabola with vertex at (2, 1)
(c) An ellipse with centre at (2, 1) (d) None of these

68. The graph represented by the equations $x=\sin^2 t$, $y=2\cos t$ is **[EAMCET 1993]**

(a) A portion of a parabola (b) A parabola (c) A part of a sine graph (d) A Part of a hyperbola

69. The curve described parametrically by $x=t^2+t+1, y=t^2-t+1$ represents **[IIT 1999]**

(a) A pair of straight lines (b) An ellipse (c) A parabola (d) A hyperbola

Position of a Point, Intersection of Line and Parabola, Tangents and Pair of Tangents

Basic Level

70. The equation of the tangent at a point $P(t)$ where 't' is any parameter to the parabola $y^2=4ax$, is **[MNR 1983]**

(a) $yt=x+at^2$ (b) $y=xt+at^2$ (c) $y=xt+\frac{a}{t}$ (d) $y=tx$

71. The condition for which the straight line $y=mx+c$ touches the parabola $y^2=4ax$ is **[MP PET 1997, 2001]**

(a) $a=c$ (b) $\frac{a}{c}=m$ (c) $m=a^2c$ (d) $m=ac^2$

72. The line $y=mx+c$ touches the parabola $x^2=4ay$, if **[MNR 1973; MP PET 1994, 1999]**

(a) $c=-am$ (b) $c=-a/m$ (c) $c=-am^2$ (d) $c=a/m^2$

73. The line $y=2x+c$ is tangent to the parabola $y^2=16x$, if c equals **[MNR 1988]**

(a) –2 (b) –1 (c) 0 (d) 2

74. The line $y = 2x + c$ is tangent to the parabola $y^2 = 4x$, then $c =$ **[MP PET 1996]**

(a) $-\frac{1}{2}$ (b) $\frac{1}{2}$ (c) $\frac{1}{3}$ (d) 4

75. If line $x = my + k$ touches the parabola $x^2 = 4ay$, then $k =$ **[MP PET 1995]**

(a) $\frac{a}{m}$ (b) am (c) am^2 (d) $-am^2$

76. The line $y = mx + 1$ is a tangent to the parabola $y^2 = 4x$, if **[MNR 1990; Kurukshetra CEE 1998; DCE 2000]**

(a) $m = 1$ (b) $m = 2$ (c) $m = 4$ (d) $m = 3$

77. The line $lx + my + n = 0$ will touch the parabola $y^2 = 4ax$, if **[Rajasthan PET 1988; MNR 1977; MP PET 2003]**

(a) $mn = al^2$ (b) $lm = an^2$ (c) $ln = am^2$ (d) $mn = al$

78. The equation of the tangent to the parabola $y^2 = 4x + 5$ parallel to the line $y = 2x + 7$ is **[MNR 1979]**

(a) $2x - y - 3 = 0$ (b) $2x - y + 3 = 0$ (c) $2x + y + 3 = 0$ (d) None of these

79. If $lx + my + n = 0$ is tangent to the parabola $x^2 = y$, then condition of tangency is **[Rajasthan PET 1999]**

(a) $l^2 = 2mn$ (b) $l = 4m^2n^2$ (c) $m^2 = 4ln$ (d) $l^2 = 4mn$

80. The point at which the line $y = mx + c$ touches the parabola $y^2 = 4ax$ is **[Rajasthan PET 2001]**

(a) $\left(\frac{a}{m^2}, \frac{2a}{m}\right)$ (b) $\left(\frac{a}{m^2}, \frac{-2a}{m}\right)$ (c) $\left(-\frac{a}{m^2}, \frac{2a}{m}\right)$ (d) $\left(-\frac{a}{m^2}, -\frac{2a}{m}\right)$

81. The locus of a foot of perpendicular drawn to the tangent of parabola $y^2 = 4ax$ from focus, is **[Rajasthan PET 1989]**

(a) $x = 0$ (b) $y = 0$ (c) $y^2 = 2a(x + a)$ (d) $x^2 + y^2(x + a) = 0$

82. The equation of tangent at the point (1, 2) to the parabola $y^2 = 4x$, is **[Rajasthan PET 1984, 85, 86]**

(a) $x - y + 1 = 0$ (b) $x + y + 1 = 0$ (c) $x + y - 1 = 0$ (d) $x - y - 1 = 0$

83. The tangent to the parabola $y^2 = 4ax$ at the point $(a, 2a)$ makes with x-axis an angle equal to **[SCRA 1996]**

(a) $\frac{\pi}{3}$ (b) $\frac{\pi}{4}$ (c) $\frac{\pi}{2}$ (d) $\frac{\pi}{6}$

84. A tangents to the parabola $y^2 = 8x$ makes an angle of 45^o with the straight line $y = 3x + 5$; then the equation of tangent is

(a) $2x + y - 1 = 0$ (b) $x + 2y - 1 = 0$ (c) $2x + y + 1 = 0$ (d) None of these

85. The equation of the tangent to the parabola $y^2 = 9x$ which goes through the point $(4, 10)$ is **[MP PET 2000]**

(a) $x + 4y + 1 = 0$ (b) $9x + 4y + 4 = 0$ (c) $x - 4y + 36 = 0$ (d) $9x - 4y + 4 = 0$

86. The angle of intersection between the curves $y^2 = 4x$ and $x^2 = 32y$ at point $(16, 8)$ is **[Rajasthan PET 1987, 96]**

(a) $\tan^{-1}\left(\frac{3}{5}\right)$ (b) $\tan^{-1}\left(\frac{4}{5}\right)$ (c) π (d) $\frac{\pi}{2}$

87. The equation of the tangent to the parabola $y = x^2 - x$ at the point where $x = 1$, is **[MP PET 1992]**

(a) $y = -x - 1$ (b) $y = -x + 1$ (c) $y = x + 1$ (d) $y = x - 1$

88. The point of intersection of the tangents to the parabola $y^2 = 4ax$ at the points t_1 and t_2 is **[Rajasthan PET 2002]**

(a) $(at_1t_2, a(t_1 + t_2))$ (b) $(2at_1t_2, a(t_1 + t_2))$ (c) $(2at_1t_2, 2a(t_1 + t_2))$ (d) None of these

89. The tangents drawn from the ends of latus rectum of $y^2 = 12x$ meets at **[Rajasthan PET 2000]**

(a) Directrix (b) Vertex (c) Focus (d) None of these

90. Two perpendicular tangents to $y^2 = 4ax$ always intersect on the line **[Karnataka CET 2000]**

(a) $x = a$ (b) $x + a = 0$ (c) $x + 2a = 0$ (d) $x + 4a = 0$

91. The locus of the point of intersection of the perpendicular tangents to the parabola $x^2 = 4ay$ is **[MP PET 1994]**

(a) Axis of the parabola (b) Directrix of the parabola

(c) Focal chord of the parabola (d) Tangent at vertex to the parabola

92. The angle between the tangents drawn from the origin to the parabola $y^2 = 4a(x - a)$ is **[MNR 1994; UPSEAT 1999, 2000]**

(a) 90^o (b) 30^o (c) $\tan^{-1}\frac{1}{2}$ (d) 45^o

93. The angle between tangents to the parabola $y^2 = 4ax$ at the points where it intersects with the line $x - y - a = 0$, is

(a) $\frac{\pi}{3}$ (b) $\frac{\pi}{4}$ (c) $\frac{\pi}{6}$ (d) $\frac{\pi}{2}$

94. The equation of latus rectum of a parabola is $x + y = 8$ and the equation of the tangent at the vertex is $x + y = 12$, then length of the latus rectum is **[MP PET 2002]**

(a) $4\sqrt{2}$ (b) $2\sqrt{2}$ (c) 8 (d) $8\sqrt{2}$

95. 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

(a) $4al + n = 0$ (b) $4al + 4am + n = 0$ (c) $4am + n = 0$ (d) $al + n = 0$

96. Tangents at the extremities of any focal chord of a parabola intersect

(a) At right angles (b) On the directrix (c) On the tangent at vertex (d) None of these

97. Angle between two curves $y^2 = 4(x + 1)$ and $x^2 = 4(y + 1)$ is **[UPSEAT 2002]**

(a) 0^o (b) 90^o (c) 60^o (d) 30^o

98. The angle of intersection between the curves $x^2 = 4(y + 1)$ and $x^2 = -4(y + 1)$ is **[UPSEAT 2002]**

(a) $\frac{\pi}{6}$ (b) $\frac{\pi}{4}$ (c) 0 (d) $\frac{\pi}{2}$

99. If the tangents drawn from the point (0, 2) to the parabola $y^2 = 4ax$ are inclined at an angle $\frac{3\pi}{4}$, then the value of a is

(a) 2 (b) –2 (c) 1 (d) None of these

100. The point of intersection of the tangents to the parabola $y^2 = 4x$ at the points, where the parameter 't' has the value 1 and 2, is

(a) (3, 8) (b) (1, 5) (c) (2, 3) (d) (4, 6)

101. The tangents from the origin to the parabola $y^2 + 4 = 4x$ are inclined at

(a) $\frac{\pi}{6}$ (b) $\frac{\pi}{4}$ (c) $\frac{\pi}{3}$ (d) $\frac{\pi}{2}$

102. The number of distinct real tangents that can be drawn from (0, –2) to the parabola $y^2 = 4x$ is

(a) One (b) Two (c) Zero (d) None of these

103. If two tangents drawn from the point (α, β) to the parabola $y^2 = 4x$ be such that the slope of one tangent is double of the other, then

(a) $\beta = \frac{2}{9}\alpha^2$ (b) $\alpha = \frac{2}{9}\beta^2$ (c) $2\alpha = 9\beta^2$ (d) None of these

104. If $y + b = m_1(x + a)$ and $y + b = m_2(x + a)$ are two tangents to the parabola $y^2 = 4ax$, then

(a) $m_1 + m_2 = 0$ (b) $m_1 m_2 = 1$ (c) $m_1 m_2 = -1$ (d) None of these

105. If $y = mx + c$ touches the parabola $y^2 = 4a(x + a)$, then

(a) $c = \frac{a}{m}$ (b) $c = am + \frac{a}{m}$ (c) $c = a + \frac{a}{m}$ (d) None of these

106. The angle between the tangents drawn from a point $(-a, 2a)$ to $y^2 = 4ax$ is

(a) $\frac{\pi}{4}$ (b) $\frac{\pi}{2}$ (c) $\frac{\pi}{3}$ (d) $\frac{\pi}{6}$

107. The tangents to the parabola $y^2 = 4ax$ at $(at_1^2, 2at_1)$; (at_2^2, at_2) intersect on its axis, then **[EAMCET 1995]**

(a) $t_2 = t_2$ (b) $t_1 = -t_2$ (c) $t_1 t_2 = 2$ (d) $t_1 t_2 = -1$

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

(a) 4 (b) $4a$ (c) $4k$ (d) $4ak$

109. The straight line $kx + y = 4$ touches the parabola $y = x - x^2$, if

(a) $k = -5$ (b) $k = 0$ (c) $k = 3$ (d) k takes any real value

110. If a tangent to the parabola $y^2 = ax$ makes an angle 45^o with x-axis, its points of contact will be

(a) $(a/2, a/4)$ (b) $(-a/2, a/4)$ (c) $(a/4, a/2)$ (d) $(-a/4, a/2)$

111. The equations of common tangent to the parabola $y^2 = 4ax$ and $x^2 = 4by$ is

(a) $xa^{1/3} + yb^{1/3} + (ab)^{2/3} = 0$

(b) $\frac{x}{a^{1/3}} + \frac{y}{b^{1/3}} + \frac{1}{(ab)^{2/3}} = 0$

(c) $xb^{\frac{1}{3}} + ya^{\frac{1}{3}} - (ab)^{\frac{2}{3}} = 0$

(d) $\frac{x}{b^{1/3}} + \frac{y}{a^{1/3}} - \frac{1}{(ab)^{2/3}} = 0$

112. The range of values of λ for which the point $(\lambda, -1)$ is exterior to both the parabolas $y^2 = |x|$ is

(a) (0, 1) (b) (–1, 1) (c) (–1, 0) (d) None of these

Advance Level

113. The line $x\cos\alpha + y\sin\alpha = p$ will touch the parabola $y^2 = 4a(x + a)$, if

(a) $p\cos\alpha + a = 0$ (b) $p\cos\alpha - a = 0$ (c) $a\cos\alpha + p = 0$ (d) $a\cos\alpha - p = 0$

114. If the straight line $x + y = 1$ touches the parabola $y^2 - y + x = 0$, then the coordinates of the point of contact are **[Rajasthan PET 1991]**

(a) (1, 1) (b) $\left(\frac{1}{2}, \frac{1}{2}\right)$ (c) (0, 1) (d) (1, 0)

115. The equation of common tangent to the circle $x^2 + y^2 = 2$ and parabola $y^2 = 8x$ is **[Rajasthan PET 1997]**

(a) $y = x + 1$ (b) $y = x + 2$ (c) $y = x - 2$ (d) $y = -x + 2$

116. The equation of the common tangent to the curves $y^2 = 8x$ and $xy = -1$ is **[IIT Screening 2002]**

(a) $3y = 9x + 2$ (b) $y = 2x + 1$ (c) $2y = x + 8$ (d) $y = x + 2$

117. Two common tangents to the circle $x^2 + y^2 = 2a^2$ and parabola $y^2 = 8ax$ are **[AIEEE 2002]**

(a) $x = \pm(y + 2a)$ (b) $y = \pm(x + 2a)$ (c) $x = \pm(y + a)$ (d) $y = \pm(x + a)$

118. If the line $lx + my + n = 0$ is a tangent to the parabola $y^2 = 4ax$, then locus of its point of contact is **[Rajasthan PET 1997]**

(a) A straight line (b) A circle (c) A parabola (d) Two straight lines

119. The tangent drawn at any point P to the parabola $y^2 = 4ax$ meets the directrix at the point K, then the angle which KP subtends at its focus is **[Rajasthan PET 1996, 2002]**

(a) 30^o (b) 45^o (c) 60^o (d) 90^o

120. The point of intersection of tangents at the ends of the latus rectum of the parabola $y^2 = 4x$ is **[IIT 1994; Kurukshetra CEE 1998]**

(a) (1, 0) (b) (–1, 0) (c) (0, 1) (d) (0, –1)

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

(a) y_1, y_2, y_3 are in A. P. (b) y_1, y_3, y_2 are in A. P. (c) y_1, y_2, y_3 are in G.P. (d) y_1, y_3, y_2 are in G. P.

122. If the tangents at *P* and *Q* on a parabola meet in *T*, then *SP*,*ST* and *SQ* are in

(a) A. P. (b) G. P. (c) H. P. (d) None of these

123. The equation of the parabola whose focus is the point (0, 0) and the tangent at the vertex is $x - y + 1 = 0$ is **[Orissa JEE 2002]**

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

(c) $x^2 + y^2 + 2xy - 4x + 4y - 4 = 0$ (d) $x^2 + y^2 + 2xy - 4x - 4y + 4 = 0$

124. The two parabolas $y^2 = 4x$ and $x^2 = 4y$ intersect at a point *P*, whose abscissae is not zero, such that

(a) They both touch each other at *P*

(b) They cut at right angles at *P*

(c) The tangents to each curve at *P* make complementary angles with the *x*-axis

(d) None of these

125. Consider a circle with its centre lying on the focus of the parabola $y^2 = 2px$ such that it touches the directrix of the parabola. Then , a point of intersection of the circle and the parabola is **[IIT 1995]**

(a) $\left(\frac{p}{2}, p\right)$ (b) $\left(\frac{p}{2}, -p\right)$ (c) $\left(\frac{-p}{2}, p\right)$ (d) $\left(\frac{-p}{2}, -p\right)$

126. The angle of intersection of the curves $y^2 = 2x/\pi$ and $y = \sin x$, is **[Roorkee Qualifying 1998]**

(a) $\cot^{-1}(-1/\pi)$ (b) $\cot^{-1}\pi$ (c) $\cot^{-1}(-\pi)$ (d) $\cot^{-1}(1/\pi)$

127. *P* is a point. Two tangents are drawn from it to the parabola $y^2 = 4x$ such that the slope of one tangent is three times the slope of the other. The locus of *P* is

(a) A straight line (b) A circle (c) A parabola (d) An ellipse

128. The parabola $y^2 = kx$ makes an intercept of length 4 on the line $x - 2y = 1$ .Then *k* is

(a) $\frac{\sqrt{105} - 5}{10}$ (b) $\frac{5 - \sqrt{105}}{10}$ (c) $\frac{5 + \sqrt{105}}{10}$ (d) None of these

129. The triangle formed by the tangents to a parabola $y^2 = 4ax$ at the ends of the latus rectum and the double ordinates through the focus is

(a) Equilateral (b) Isosceles

(c) Right-angled isosceles (d) Dependent on the value of *a* for its classification

130. The equation of the tangent at the vertex of the parabola $x^2 + 4x + 2y = 0$ is

(a) $x = -2$ (b) $x = 2$ (c) $y = 2$ (d) $y = -2$

131. The locus of the point of intersection of the perpendicular tangents to the parabola $x^2 - 8x + 2y + 2 = 0$ is

(a) $2y - 15 = 0$ (b) $2y + 15 = 0$ (c) $2x + 9 = 0$ (d) None of these

132. If *P*,*Q*,*R* are three points on a parabola $y^2 = 4ax$, whose ordinates are in geometrical progression, then the tangents at *P* and *R* meet on

(a) The line through *Q* parallel to *x*-axis (b) The line through *Q* parallel to *y*-axis

(c) The line joining *Q* to the vertex (d) The line joining *Q* to the focus

133. The tangents at three points A, *B*, *C* on the parabola $y^2 = 4x$; taken in pairs intersect at the points *P*, *Q* and *R*. If Δ, Δ' be the areas of the triangles *ABC* and *PQR* respectively, then

(a) $\Delta = 2\Delta'$ (b) $\Delta' = 2\Delta$ (c) $\Delta = \Delta'$ (d) None of these

134. If the line $y = mx + a$ meets the parabola $y^2 = 4ax$ in two points whose abscissa are x_1 and x_2 , then $x_1 + x_2$ is equal to zero if

(a) $m = -1$ (b) $m = 1$ (c) $m = 2$ (d) $m = -1/2$

135. Two tangents of the parabola $y^2 = 8x$, meet the tangent at its vertex in the points P and Q. If $PQ = 4$, locus of the point of intersection of the two tangents is

(a) $y^2 = 8(x+2)$ (b) $y^2 = 8(x-2)$ (c) $x^2 = 8(y-2)$ (d) $x^2 = 8(y+2)$

136. If perpendicular be drawn from any two fixed points on the axis of a parabola at a distance d from the focus on any tangent to it, then the difference of their squares is

(a) $a^2 - d^2$ (b) $a^2 + d^2$ (c) $4ad$ (d) $2ad$

137. Two straight lines are perpendicular to each other. One of them touches the parabola $y^2 = 4a(x+a)$ and the other touches $y^2 = 4b(x+b)$. Their point of intersection lies on the line

(a) $x - a + b = 0$ (b) $x + a - b = 0$ (c) $x + a + b = 0$ (d) $x - a - b = 0$

138. The point $(a, 2a)$ is an interior point of the region bounded by the parabola $y^2 = 16x$ and the double ordinate through the focus. Then a belongs to the open interval

(a) $a < 4$ (b) $0 < a < 4$ (c) $0 < a < 2$ (d) $a > 4$

139. The number of points with integral coordinates that lie in the interior of the region common to the circle $x^2 + y^2 = 16$ and the parabola $y^2 = 4x$ is

(a) 8 (b) 10 (c) 16 (d) None of these

Normals in different forms, Intersection of Normals

Basic Level

140. The maximum number of normal that can be drawn from a point to a parabola is **[MP PET 1990]**

(a) 0 (b) 1 (c) 2 (d) 3

141. The centroid of the triangle formed by joining the feet of the normals drawn from any point to the parabola $y^2 = 4ax$, lies on **[MP PET 1999]**

(a) Axis (b) Directrix (c) Latus rectum (d) Tangent at vertex

142. If the line $2x + y + k = 0$ is normal to the parabola $y^2 = -8x$, then the value of k will be **[Rajasthan PET 1986, 1997]**

(a) –16 (b) –8 (c) –24 (d) 24

143. The point on the parabola $y^2 = 8x$ at which the normal is inclined at 60^o to the x-axis has the coordinates **[MP PET 1993]**

(a) $(6, -4\sqrt{3})$ (b) $(6, 4\sqrt{3})$ (c) $(-6, -4\sqrt{3})$ (d) $(-6, 4\sqrt{3})$

144. If the normals at two points P and Q of a parabola $y^2 = 4ax$ intersect at a third point R on the curve, then the product of ordinates of P and Q is

(a) $4a^2$ (b) $2a^2$ (c) $-4a^2$ (d) $8a^2$

145. The equation of normal to the parabola at the point $\left(\frac{a}{m^2}, \frac{2a}{m}\right)$, is **[Rajasthan PET 1987]**

(a) $y = m^2x - 2mx - am^3$ (b) $m^3y = m^2x - 2am^2 - a$ (c) $m^3y = 2am^2 - m^2x + a$ (d) None of these

146. At what point on the parabola $y^2 = 4x$, the normal makes equal angles with the coordinate axes **[Rajasthan PET 1994]**

(a) $(4, 4)$ (b) $(9, 6)$ (c) $(4, -4)$ (d) $(1, -2)$

147. The slope of the normal at the point $(at^2, 2at)$ of the parabola $y^2 = 4ax$, is **[MNR 1991; UPSEAT 2000]**

(a) $\frac{1}{t}$ (b) t (c) $-t$ (d) $-\frac{1}{t}$

148. The normal at the point $(bt_1^2, 2bt_1)$ on a parabola meets the parabola again in the point $(bt_2^2, 2bt_2)$, then

[MNR 1986; Rajasthan PET 2003; AIEEE 2003]

(a) $t_2 = -t_1 - \frac{2}{t_1}$ (b) $t_2 = -t_1 + \frac{2}{t_1}$ (c) $t_2 = t_1 - \frac{2}{t_1}$ (d) $t_2 = t_1 + \frac{2}{t_1}$

149. The normal to the parabola $y^2 = 8x$ at the point (2, 4) meets the parabola again at the point **[Orissa JEE 2003]**

(a) (–18,–12) (b) (–18, 12) (c) (18, 12) (d) (18, –12)

150. If a normal drawn to the parabola $y^2 = 4ax$ at the point $(a, 2a)$ meets parabola again on $(at^2, 2at)$, then the value of t will be **[Rajasthan PET 1990]**

(a) 1 (b) 3 (c) –1 (d) –3

151. The arithmetic mean of the ordinates of the feet of the normals from (3, 5) to the parabola $y^2 = 8x$ is

(a) 4 (b) 0 (c) 8 (d) None of these

152. If the normal to $y^2 = 12x$ at (3, 6) meets the parabola again in (27, –18) and the circle on the normal chord as diameter is **[Kurukshetra CEE 1998]**

(a) $x^2 + y^2 + 30x + 12y - 27 = 0$ (b) $x^2 + y^2 + 30x + 12y + 27 = 0$

(c) $x^2 + y^2 - 30x - 12y - 27 = 0$ (d) $x^2 + y^2 - 30x + 12y - 27 = 0$

153. The number of distinct normal that can be drawn from $\left(\frac{11}{4}, \frac{1}{4}\right)$ to the parabola $y^2 = 4x$ is

(a) 3 (b) 2 (c) 1 (d) 4

154. The normal chord of a parabola $y^2 = 4ax$ at (x_1, x_1) subtends a right angle at the

(a) Focus (b) Vertex (c) End of the latus-rectum (d) None of these

155. The normal at $(ap^2, 2ap)$ on $y^2 = 4ax$, meets the curve again at $(aq^2, 2aq)$ then

(a) $p^2 + pq + 2 = 0$ (b) $p^2 - pq + 2 = 0$ (c) $q^2 + pq + 2 = 0$ (d) $p^2 + pq + 1 = 0$

156. The angle between the normals to the parabola $y^2 = 24x$ at points (6, 12) and (6, –12) is

(a) 30^o (b) 45^o (c) 60^o (d) 90^o

Advance Level

157. The centre of a circle passing through the point (0,1) and touching the curve $y = x^2$ at (2, 4) is **[IIT 1983]**

(a) $\left(\frac{-16}{5}, \frac{27}{10}\right)$ (b) $\left(\frac{-16}{7}, \frac{5}{10}\right)$ (c) $\left(\frac{-16}{5}, \frac{53}{10}\right)$ (d) None of these

158. The length of the normal chord to the parabola $y^2 = 4x$, which subtends right angle at the vertex is **[Rajasthan PET 1999]**

(a) $6\sqrt{3}$ (b) $3\sqrt{3}$ (c) 2 (d) 1

159. Three normals to the parabola $y^2 = x$ are drawn through a point $(C, 0)$ then **[IIT 1991]**

(a) $C = \frac{1}{4}$ (b) $C = \frac{1}{2}$ (c) $C > \frac{1}{2}$ (d) None of these

160. If the tangent and normal at any point P of a parabola meet the axes in T and G respectively, then **[Rajasthan PET 2001]**

(a) $ST \neq SG = SP$ (b) $ST - SG \neq SP$ (c) $ST = SG = SP$ (d) $ST = SG \,.\, SP$

161. The number of distinct normals that can be drawn from (–2, 1) to the parabola $y^2 - 4x - 2y - 3 = 0$ is

(a) 1 (b) 2 (c) 3 (d) 0

162. The set of points on the axis of the parabola $y^2 = 4x + 8$ from which the 3 normals to the parabola are all real and different is

(a) $\{(k,0)|\ k \le -2\}$ (b) $\{(k,0)|\ k > -2\}$ (c) $\{(0,k)|\ k > -2\}$ (d) None of these

163. The area of the triangle formed by the tangent and the normal to the parabola $y^2 = 4ax$; both drawn at the same end of the latus rectum, and the axis of the parabola is

(a) $2\sqrt{2}\,a^2$ (b) $2a^2$ (c) $4a^2$ (d) None of these

164. If a chord which is normal to the parabola $y^2 = 4ax$ at one end subtends a right angle at the vertex, then its slope is

(a) 1 (b) $\sqrt{3}$ (c) $\sqrt{2}$ (d) 2

165. If the normals from any point to the parabola $x^2 = 4y$ cuts the line $y = 2$ in points whose abscissae are in A.P., then the slopes of the tangents at the three co-normal points are in

(a) A.P. (b) G.P. (c) H.P. (d) None of these

166. If $x = my + c$ is a normal to the parabola $x^2 = 4ay$, then the value of c is

(a) $-2am - am^3$ (b) $2am + am^3$ (c) $-\frac{2a}{m} - \frac{a}{m^3}$ (d) $\frac{2a}{m} + \frac{a}{m^3}$

167. The normal at the point $P(ap^2, 2ap)$ meets the parabola $y^2 = 4ax$ again at $Q(aq^2, 2aq)$ such that the lines joining the origin to P and Q are at right angle. Then

(a) $p^2 = 2$ (b) $q^2 = 2$ (c) $p = 2q$ (d) $q = 2p$

168. If $y = 2x + 3$ is a tangent to the parabola $y^2 = 24x$, then its distance from the parallel normal is

(a) $5\sqrt{5}$ (b) $10\sqrt{5}$ (c) $15\sqrt{5}$ (d) None of these

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

(a) $\frac{-1}{2}$ (b) 2 (c) $\frac{1}{2}$ (d) –2

170. The distance between a tangent to the parabola $y^2 = 4ax$ which is inclined to axis at an angle α and a parallel normal is

(a) $\frac{a\cos\alpha}{\sin^2\alpha}$ (b) $\frac{a\sin\alpha}{\cos^2\alpha}$ (c) $\frac{a}{\sin\alpha\cos^2\alpha}$ (d) $\frac{a}{\cos\alpha\sin^2\alpha}$

171. If the normal to the parabola $y^2 = 4ax$ at the point $P(at^2, 2at)$ cuts the parabola again at $Q(aT^2, 2aT)$, then

(a) $-2 \le \dot{T} \le 2$ (b) $T \in (-\infty, -8) \cup (8, \infty)$ (c) $T^2 < 8$ (d) $T^2 \ge 8$

Chords

Basic Level

172. The locus of the middle points of the chords of the parabola $y^2 = 4ax$ which passes through the origin is

[Rajasthan PET 1997; UPSEAT 1999]

(a) $y^2 = ax$ (b) $y^2 = 2ax$ (c) $y^2 = 4ax$ (d) $x^2 = 4ay$

173. In the parabola $y^2 = 6x$, the equation of the chord through vertex and negative end of latus rectum, is

(a) $y = 2x$ (b) $y + 2x = 0$ (c) $x = 2y$ (d) $x + 2y = 0$

174. From the point $(-1, 2)$ tangent lines are drawn to the parabola $y^2 = 4x$, then the equation of chord of contact is **[Roorkee 1994]**

(a) $y = x + 1$ (b) $y = x - 1$ (c) $y + x = 1$ (d) None of these

175. A set of parallel chords of the parabola $y^2 = 4ax$ have their mid points on

(a) Any straight line through the vertex (b) Any straight line through the focus

(c) A straight line parallel to the axis (d) Another parabola

176. The length of the chord of the parabola $y^2 = 4ax$ which passes through the vertex and makes an angle θ with the axis of the parabola, is

(a) $4a\cos\theta\,\text{cosec}^2\theta$ (b) $4a\cos^2\theta\,\text{cosec}\,\theta$ (c) $a\cos\theta\,\text{cosec}^2\theta$ (d) $a\cos^2\theta\,\text{cosec}\,\theta$

177. If PSQ is the focal chord of the parabola $y^2 = 8x$ such that $SP = 6$. Then the length SQ is

(a) 6 (b) 4 (c) 3 (d) None of these

178. The locus of the middle points of parallel chords of a parabola $x^2 = 4ay$ is a

(a) Straight line parallel to the axis

(b) Straight line parallel to the y-axis

(c) Circle

(d) Straight line parallel to a bisector of the angles between the axes

179. The locus of the middle points of chords of the parabola $y^2 = 8x$ drawn through the vertex is a parabola whose

(a) focus is (2, 0) (b) Latus rectum =8 (c) Focus is (0, 2) (d) Latus rectum =4

180. 't_1' and 't_2' are two points on the parabola $y^2 = 4x$. If the chord joining them is a normal to the parabola at 't_1', then

(a) $t_1 + t_2 = 0$ (b) $t_1(t_1 + t_2) = 0$ (c) $t_1(t_1 + t_2) + 2 = 0$ (d) $t_1 t_2 + 1 = 0$

181. The locus of the middle points of chords of a parabola which subtend a right angle at the vertex of the parabola is

(a) A circle (b) An ellipse (c) A parabola (d) None of these

182. AB is a chord of the parabola $y^2 = 4ax$. If its equation is $y = mx + c$ and it subtends a right angle at the vertex of the parabola then

(a) $c = 4am$ (b) $a = 4mc$ (c) $c = -4am$ (d) $a + 4mc = 0$

183. The length of a focal chord of parabola $y^2 = 4ax$ making an angle θ with the axis of the parabola is

(a) $4a\,\text{cosec}^2\theta$ (b) $4a\sec^2\theta$ (c) $a\,\text{cosec}^2\theta$ (d) None of these

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

(a) $a = 2b$ (b) $2a = b$ (c) $a^2 = 2b$ (d) $2a = b^2$

185. The mid-point of the chord $2x + y - 4 = 0$ of the parabola $y^2 = 4x$ is

(a) $\left(\frac{5}{2}, -1\right)$ (b) $\left(-1, \frac{5}{2}\right)$ (c) $\left(\frac{3}{2}, -1\right)$ (d) None of these

186. If $P(at_1^2, 2at_1)$ and $Q(at_2^2, 2at_2)$ are two variable points on the curve $y^2 = 4ax$ and PQ subtends a right angle at the vertex, then $t_1 t_2$ is equal to

(a) –1 (b) – 2 (c) –3 (d) –4

187. If $(at^2, 2at)$ are the coordinates of one end of a focal chord of the parabola $y^2 = 4ax$, then the coordinate of the other end are

(a) $(at^2, -2at)$ (b) $(-at^2, -2at)$ (c) $\left(\frac{a}{t^2}, \frac{2a}{t}\right)$ (d) $\left(\frac{a}{t^2}, \frac{-2a}{t}\right)$

188. If b and c are the lengths of the segments of any focal chord of a parabola $y^2 = 4ax$, then the length of the semi- latusrectum is

(a) $\frac{b+c}{2}$ (b) $\frac{bc}{b+c}$ (c) $\frac{2bc}{b+c}$ (d) $\sqrt{bc}$

189. The ratio in which the line segment joining the points $(4, -6)$ and $(3, 1)$ is divided by the parabola $y^2 = 4x$ is

(a) $\frac{-20 \pm \sqrt{155}}{11} : 1$ (b) $\frac{-2 \pm 2\sqrt{155}}{11} : 1$ (c) $-20 \pm 2\sqrt{155} : 11$ (d) $-2 \pm \sqrt{155} : 11$

190. If the lengths of the two segments of focal chord of the parabola $y^2 = 4ax$ are 3 and 5, then the value of a will be

(a) $\frac{15}{8}$ (b) $\frac{15}{4}$ (c) $\frac{15}{2}$ (d) 15

Advance Level

191. If 'a' and 'c' are the segments of a focal chord of a parabola and b the semi-latus rectum, then **[MP PET 1995]**

(a) a, b, c are in A. P. (b) a, b, c are in G. P. (c) a, b, c are in H. P. (d) None of these

192. The locus of mid point of that chord of parabola which subtends right angle on the vertex will be **[UPSEAT 1999]**

(a) $y^2 - 2ax + 8a^2 = 0$ (b) $y^2 = a(x - 4a)$ (c) $y^2 = 4a(x - 4a)$ (d) $y^2 + 3ax + 4a^2 = 0$

193. The HM of the segments of a focal chord of the parabola $y^2 = 4ax$ is

(a) $4a$ (b) $2a$ (c) a (d) a^2

194. The length of a focal chord of the parabola $y^2 = 4ax$ at a distance b from the vertex is c. Then

(a) $2a^2 = bc$ (b) $a^3 = b^2c$ (c) $ac = b^2$ (d) $b^2c = 4a^3$

195. A chord PP' of a parabola cuts the axis of the parabola at O. The feet of the perpendiculars from P and P' on the axis are M and M' respectively. If V is the vertex then VM, VO, VM' are in

(a) *A.P.* (b) *G.P.* (c) *H.P.* (d) None of these

196. The chord AB of the parabola $y^2 = 4ax$ cuts the axis of the parabola at C. If $A = (at_1^2, 2at_1)$; $B = (at_2^2, 2at_2)$ and $AC : AB = 1 : 3$, then

(a) $t_2 = 2t_1$ (b) $t_2 + 2t_1 = 0$ (c) $t_1 + 2t_2 = 0$ (d) None of these

197. The locus of the middle points of the focal chord of the parabola $y^2 = 4ax$ is

(a) $y^2 = a(x - a)$ (b) $y^2 = 2a(x - a)$ (c) $y^2 = 4a(x - a)$ (d) None of these

198. If $(4, -2)$ is one end of a focal chord of the parabola $y^2 = x$, then the slope of the tangent drawn at its other end will be

(a) $-\frac{1}{4}$ (b) -4 (c) 4 (d) $\frac{1}{4}$

199. If (a_1, b_1) and (a_2, b_2) are extremities of a focal chord of the parabola $y^2 = 4ax$, then $a_1a_2 =$

(a) $4a^2$ (b) $-4a^2$ (c) a^2 (d) $-a^2$

200. The length of the chord of the parabola $y^2 = 4ax$ whose equation is $y - x\sqrt{2} + 4a\sqrt{2} = 0$ is

(a) $2\sqrt{11}a$ (b) $4\sqrt{2}a$ (c) $8\sqrt{2}a$ (d) $6\sqrt{3}a$

201. If the line $y = x\sqrt{3} - 3$ cuts the parabola $y^2 = x + 2$ at P and Q and if A be the point $(\sqrt{3}, 0)$, then $AP. AQ$ is

(a) $\frac{2}{3}(\sqrt{3} + 2)$ (b) $\frac{4}{3}(\sqrt{3} + 2)$ (c) $\frac{4}{3}(2 - \sqrt{3})$ (d) $2\sqrt{3}$

202. A triangle ABC of area Δ is inscribed in the parabola $y^2 = 4ax$ such that the vertex A lies at the vertex of the parabola and BC is a focal chord. The difference of the distances of B and C from the axis of the parabola is

(a) $\frac{2\Delta}{a}$ (b) $\frac{2\Delta}{a^2}$ (c) $\frac{a}{2\Delta}$ (d) None of these

Diameter of Parabola, Length of tangent, Normal and Subnormal, Pole and Polar

Basic Level

203. The length of the subnormal to the parabola $y^2 = 4ax$ at any point is equal to **[UPSEAT 2000]**

(a) $\sqrt{2}a$ (b) $2\sqrt{2}$ (c) $a/\sqrt{2}$ (d) $2a$

204. The polar of focus of a parabola is **[Rajasthan PET 1999]**

(a) x-axis (b) y-axis (c) Directrix (d) Latus rectum

205. Locus of the poles of focal chords of a parabola is .....of parabola **[EAMCET 2002]**

(a) The tangent at the vertex (b) The axis (c) A focal chord (d) The directrix

206. The subtangent, ordinate and subnormal to the parabola $y^2 = 4ax$ at a point (different from the origin) are in **[EAMCET 1993]**

(a) *A.P.* (b) *G.P.* (c) *H.P.* (d) None of these

Miscellaneous Problems

Basic Level

207. The equation of a circle passing through the vertex and the extremities of the latus rectum of the parabola $y^2 = 8x$ is **[MP PET 1998]**

(a) $x^2 + y^2 + 10x = 0$ (b) $x^2 + y^2 + 10y = 0$ (c) $x^2 + y^2 - 10x = 0$ (d) $x^2 + y^2 - 5x = 0$

208. An equilateral triangle is inscribed in the parabola $y^2 = 4ax$, whose vertices are at the parabola, then the length of its side is equal to

(a) $8a$ (b) $8a\sqrt{3}$ (c) $a\sqrt{2}$ (d) None of these

209. The area of triangle formed inside the parabola $y^2 = 4x$ and whose ordinates of vertices are 1, 2 and 4 will be **[Rajasthan PET 1990]**

(a) $\frac{7}{2}$ (b) $\frac{5}{2}$ (c) $\frac{3}{2}$ (d) $\frac{3}{4}$

210. The area of the triangle formed by the lines joining the vertex of the parabola $x^2 = 12y$ to the ends of its latus rectum is

(a) 12 sq. units (b) 16 sq. units (c) 18 sq. units (d) 24 sq. units

211. The vertex of the parabola $y^2 = 8x$ is at the centre of a circle and the parabola cuts the circle at the ends of its latus rectum. Then the equation of the circle is

(a) $x^2 + y^2 = 4$ (b) $x^2 + y^2 = 20$ (c) $x^2 + y^2 = 80$ (d) None of these

212. The circle $x^2 + y^2 + 2\lambda x = 0, \lambda \in R,$ touches the parabola $y^2 = 4x$ externally. Then

(a) $\lambda > 0$ (b) $\lambda < 0$ (c) $\lambda > 1$ (d) None of these

213. The length of the common chord of the parabola $2y^2 = 3(x+1)$ and the circle $x^2 + y^2 + 2x = 0$ is

(a) $\sqrt{3}$ (b) $2\sqrt{3}$ (c) $\frac{\sqrt{3}}{2}$ (d) None of these

214. The circles on focal radii of a parabola as diameter touch

(a) The tangent at the vertex (b) The axis (c) The directrix (d) None of these

Advance Level

215. The ordinates of the triangle inscribed in parabola $y^2 = 4ax$ are y_1, y_2, y_3 , then the area of triangle is

(a) $\frac{1}{8a}(y_1 + y_2)(y_2 + y_3)(y_3 + y_1)$ (b) $\frac{1}{4a}(y_1 + y_2)(y_2 + y_3)(y_3 + y_1)$

(c) $\frac{1}{8a}(y_1 - y_2)(y_2 - y_3)(y_3 - y_1)$ (d) $\frac{1}{4a}(y_1 - y_2)(y_2 - y_3)(y_3 - y_1)$

216. Which one of the following curves cuts the parabola $y^2 = 4ax$ at right angles **[IIT Screening 1994]**

(a) $x^2 + y^2 = a^2$ (b) $y = e^{-x/2a}$ (c) $y = ax$ (d) $x^2 = 4ay$

217. On the parabola $y = x^2$, the point least distant from the straight line $y = 2x - 4$ is **[AMU 2001]**

(a) (1, 1) (b) (1, 0) (c) (1, –1) (d) (0, 0)

218. Let the equations of a circle and a parabola be $x^2 + y^2 - 4x - 6 = 0$ and $y^2 = 9x$ respectively. Then

(a) (1, –1) is a point on the common chord of contact

(b) The equation of the common chord is $y+1=0$

(c) The length of the common chord is 6

(d) None of these

219. P is a point which moves in the x-y plane such that the point P is nearer to the centre of square than any of the sides. The four vertices of the square are $(\pm a, \pm a)$. The region in which P will move is bounded by parts of parabola of which one has the equation

(a) $y^2 = a^2 + 2ax$ (b) $x^2 = a^2 + 2ay$ (c) $y^2 + 2ax = a^2$ (d) None of these

220. The focal chord to $y^2 = 16x$ is tangent to $(x-6)^2 + y^2 = 2$, then the possible values of the slope of this chord, are **[IIT Screening 2003]**

(a) {–1, 1} (b) {–2, 2} (c) {–2, 1/2} (d) {2, –1/2}

221. Let PQ be a chord of the parabola $y^2 = 4x$. A circle drawn with PQ as a diameter passes through the vertex V of the parabola. If $ar(\Delta PVQ) = 20$ unit ^{2}, then the coordinates of P are

(a) (16, 8) (b) (16, –8) (c) (–16, 8) (d) (–16, –8)

222. A normal to the parabola $y^2 = 4ax$ with slope m touches the rectangular hyperbola $x^2 - y^2 = a^2$, if

(a) $m^6 + 4m^4 - 3m^2 + 1 = 0$ (b) $m^6 - 4m^4 + 3m^2 - 1 = 0$ (c) $m^6 + 4m^4 + 3m^2 + 1 = 0$ (d) $m^6 - 4m^4 - 3m^2 + 1 = 0$

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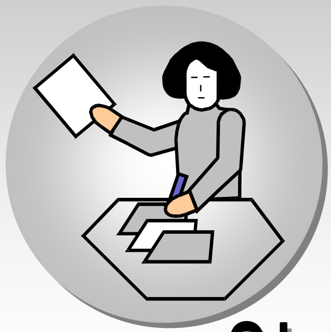

Answer Sheet

Conic Section : Parabola *Assignment (Basic and Advance Level)*

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
c	b	b	c	d	a	c	a	b	b	a	c	c	a	b,c	a,c	c	b	a	a,b,c,d
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
b	d	d	c	b	d	d	b	d	a	a	d	c	c	c	c	a	c	d	c
41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
b	c	a	b	a	a	c	a	d	a	a	c	b	b,d	a	a	b	a,c	a,b,d	b
61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
c	c	a,b	d	d	a	b	b	c	a	b	c	d	b	a	a	c	b	d	a
81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
a	a	b	c	c,d	a	d	a	a	b	b	a	d	d	a	a,b	b	c	a,b	c
101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120
d	b	b	c	b	b	b	d	a,c	c	a	b	a	c	b	d	b	c	d	b
121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140
b	b	c	c	a,b	b	c	a	c	c	a	b	a	c	a	c	c	b	a	d
141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160
a	d	a	d	c	d	c	a	d	d	b	d	a	a	a	d	c	a	c	c
161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180
a	d	c	c	b	a	a	c	a	c	d	b	b	b	c	a	c	b	d	c
181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200
c	c	a	d	a	d	d	c	c	a	c	a	b	d	b	b	b	c	c	d
201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220
b	a	d	c	d	b	c	b	d	c	b	a	a	a	c	b	a	a,c	a,b,c	a
221	222																		

a,b	c