**MATHEMATICS**

**PAGEMAKER10**

**Hyperbola**

Q1. t is parameter, then x = a y = b represent

(a) Ellipse

(b) Circle

(c) Pair or straight line

(d) Hyperbola

L1Difficulty1

Qtag Mathematics

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Q2. If p is a point on the hyperbola 16x2 – 9y2 = 144 whose foci are S1 and S2 then PS1 – PS2 is

(a) 4

(b) 6

(c) 8

(d) 12

L1Difficulty1

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Q3. The eccentricity of the Hyperbola passing through the points (3, 0), (3, 2) will be

(a)

(b)

(c)

(d)

L1Difficulty1

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Q4. The one which does not represent a hyperbola is

(a) x' y = 1

(b) x2 – y2 = 5

(c) (x – 1) (y – 3) = 3

(d) x2 – y2 = 6

L1Difficulty1

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Q5. The value of m for which y = mn + 6 is a tangent to the Hyperbola is

(a)

(b)

(c)

(d)

L1Difficulty1

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Q6. The point of contact of the line y = x – 1 with 3x2 – 4y2 = 12 is

(a) (4, 3)

(b) (3, 4)

(c) (4, –3)

(d) none

L1Difficulty1

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Q7. If the straight line x Cos + y Sin = p be a tangent to the Hyperbola , then

(a) a2Cos2 + b2Sin = p2

(b) a2Cos2 – b2Sin2 = p2

(c) a2Sin2 + b2Cos2 = p2

(d) a2Sin2 – b2Cos2

L1Difficulty1

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Q8. If the tangent on the point (2 sec , 3 tan ) on the hyperbola is parallel to 3x – y + 4 = 0 then value of is

(a) 45°

(b)

(c) 30°

(d)

L1Difficulty1

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Q9. The straight line x + y = p will touch the hyperbola 4x2 – 9y2 = 36 if

(a) p2 = 2

(b) p2 = 5

(c) 5p2 = 2

(d) 2p2 = 5

L1Difficulty1

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Q10. Let p(6, 3) be a point on the hyperbola . If the normal at the point p intersect the x-axis at (9, 0) then the eccentricity of the hyperbola is

(a)

(b)

(c)

(d)

L1Difficulty1

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**Solutions**

S1. Ans. (d)

Sol.

xt = at2 + a, yt = bt2 – b

=

Hyperbola.

S2. Ans. (b)

Sol.

PS1 – PS2 = 2 × 3 = 6

S3. Ans. (b)

Sol.

,

e =

S4. Ans. (d)

Sol.

Hyperbola 0 and

h2> ab Here

S5. Ans. (a)

Sol.

y = mx + c

c2 = a2m2 – b2

b = a2 = 100, b2 = 49

3b = 100m2 – 49

m =

S6. Ans. (a)

Sol.

3x2 – 4 (x –1)2 = 12

x = 4

y = 3

(4, 3)

S7. Ans. (b)

Sol.

x Cos + y Sin = p

y = – Cot + p Cosec

p2 Cosec2 = a2Cot2 – b2

a2Cot2 – b2Sin = p2

S8. Ans. (c)

Sol.

Differentiation of x –2 sec = 2 sec tan

Differentiation, y = 3 tan w.r.t. we get

= 3 sec2

Gradient of tangent

= Cosec

tangent is parallel to 3x – y + 4 = 0

m = 3

Cosec = 3

Cosec = 2

= 30°

S9. Ans. (d)

Sol.

y = mn + c touch Hyperbola

c2 = a2m2 – b2

m = –1, c = , a2 = p, b2 = 4

2p2 = 5

S10. Ans. (b)

Sol.

Equation of normal is

(y – 3) = (x – 6)

e =

**LEVEL-II**

Q1. Locus of the point of intersection of straight lines and is

(a) An ellipse

(b) A circle

(c) A hyperbola

(d) A parabola

L3Difficulty3

Qtag Mathematics

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Q2. The locus of a point which moves such that the difference of its distance from two fixed points is always a constant is

(a) A straight line

(b) A circle

(c) An ellipse

(d) A hyperbola

L3Difficulty3

Qtag Mathematics

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Q3. A hyperbola, having the transverse axis of length , is confocal with the ellipse Then its equation is

(a)

(b)

(c)

(d)

L3Difficulty3

Qtag Mathematics

Qcreator Pagemaker10

Q4. The distance between the foci of a hyperbola is double the distance between its vertices and the length of its conjugate axis is 6. The equation of the hyperbola referred to its axes as axes of co-ordinates is

(a)

(b)

(c)

(d)

L3Difficulty3

Qtag Mathematics

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Q5. The equation represents

(a) Parabola

(b) Ellipse

(c) Hyperbola

(d) None of these

L3Difficulty3

Qtag Mathematics

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Q6. The equation of the hyperbola whose directrix is focus and eccentricity will be

(a)

(b)

(c)

(d) None of these

L3Difficulty3

Qtag Mathematics

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Q7. The vertices of a hyperbola are at (0, 0) and (10, 0) and one of its foci is at (18, 0). The equation of the hyperbola is

(a)

(b)

(c)

(d)

L3Difficulty3

Qtag Mathematics

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Q8. The equation to the hyperbola having its eccentricity 2 and the distance between its foci is 8

(a)

(b)

(c)

(d)

L3Difficulty3

Qtag Mathematics

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Q9. The equation of the directrices of the conic are

(a)

(b)

(c)

(d)

L3Difficulty3

Qtag Mathematics

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Q10. The locus of a point moving under the condition that the line is a tangent to the hyperbola is

(a) A parabola

(b) A hyperbola

(c) An ellipse

(d) A circle

L3Difficulty3

Qtag Mathematics

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**Solutions**

S1. Ans. (c)

Sol.

…..(i)

…..(ii)

Multiplying equation (i) and (ii),

which is the equation of hyperbola.

S2. Ans. (d)

Sol.

It is obvious.

S3. Ans. (a)

Sol.

Given, an ellipse

It’s focus will be

Since, hyperbola is confocal to given ellipse, therefore

but given

Now

Hence, required equation will be,

S4. Ans. (c)

Sol.

According to given conditions, or

and Hence,

Therefore, equation is

S5. Ans. (c)

Sol.

Here coefficient of is and tht of is a hyperbola.

S6. Ans. (a)

Sol.

S7. Ans. (b)

Sol.

or

and centre of hyperbola (5, 0)

S8. Ans. (b)

Sol.

Distance between foci = 8

also

Equation of hyperbola is

S9. Ans(.c)

Sol.

Equation of directrices of are

Here

Hence,

S10. Ans. (b)

Sol.

If is tangent to the hyperbola then Here Hence locus of is which is a hyperbola.

**LEVEL-III**

Q1. The equation of the normal to the hyperbola at the point is

(a)

(b)

(c)

(d)

L5Difficulty5

Qtag Mathematics

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Q2. Consider a branch of the hyperbola with vertex at the point Let be one of the end points of its latus rectum. If is the focus of the hyperbola nearest to the point then the area of the triangle is

(a)

(b)

(c)

(d)

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

Q3. What will be equation of that chord of hyperbola , whose mid point is

(a)

(b)

(c)

(d)

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

Q4. The value of for which the line is a normal to the conic is

(a)

(b)

(c)

(d) 1

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

Q5. The equation of the director circle of the hyperbola is

(a)

(b)

(c)

(d)

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

Q6. The eccentricity of the conjugate hyperbola of the hyperbola is

(a) 2

(b) 2/

(c) 4

(d) 4/3

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

Q7. If and are eccentricities of hyperbola and its conjugate respectively, then

(a)

(b)

(c)

(d)

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

Q8. The product of the lengths of perpendiculars drawn from any point on the hyperbola to its asymptotes is

(a) 1/2

(b) 2/3

(c) 3/2

(d) 2

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

Q9. The equation of a hyperbola, whose foci are (5, 0) and (–5, 0) and the length of whose conjugate axis is 8, is

(a)

(b)

(c)

(d)

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

Q10. The equation of the hyperbola whose foci are the foci of the ellipse and the eccentricity is 2, is

(a)

(b)

(c)

(d)

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

**Solutions**

S1. Ans. (d)

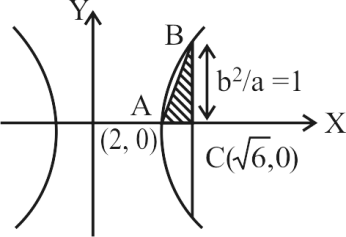
Sol.

Applying the formula, the required normal is

**Trick :** This is the only equation among the given options at which the point is located.

S2. Ans. (b)

Sol.

****

Let and

Area of

S3. Ans. (b)

Sol.

According to question,

Equation of required chord is ….(i)

Here,

and where

So from (i), required chord is

or

S4. Ans. (b)

Sol.

We know that the equation of the normal of the conic at point is

or

Comparing above equation with equation and taking

we get,

and

**Aliter :**

So, answer is (b).

S5. Ans. (a)

Sol.

Equation of the director circle of the hyperbola

S6. Ans. (a)

Sol.

Eccentricity of is

Eccentricity of conjugate hyperbola,

Write the given equation in standard form,

S7. Ans. (a)

Sol.

Let hyperbola is …(i)

Then its conjugate will be, …(ii)

If is eccentricity of hyperbola (i), then

or …(iii)

Similarly if is eccentricity of conjugate (ii), then

or …(iv)

Adding (iii) and (iv),

S8. Ans. (b)

Sol.

Given equation is …(i)

Product of length of perpendiculars drawn from any point on the hyperbola (i) to the asymptotes is .

S9. Ans. (b)

Sol.

Hence the hyperbola is

S10. Ans. (b)

Sol.

Here for given ellipse

Therefore, focus is

Given eccentricity of hyperbola = 2

and

Hence hyperbola is