**MATHEMATICS**

**PAGEMAKER10**

**Parabola**

Q1. PQ is a double ordinate of the parabola y2 = 4ax. The locus of the points of trisection of PU is

(a) 9y2 = 4ax

(b) 9x2 = 4ay

(c) 9y2 + 4ax = 0

(d) 9x2 + 4ay = 0

L1Difficulty1

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Q2. If the vertex of a parabola be at origin and directrin be x + 5 = 0, then its lotus rectum is

(a) 5

(b) 10

(c) 20

(d) 40

L1Difficulty1

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Q3. If the vector of a parabola whose directrin is x + y – 2 = 0 and focus is (3, –4) is

(a)

(b)

(c)

(d)

L1Difficulty1

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Q4. The equation of the lines joining the vertex of the parabola y2 = 6x to the points on it whose abscissa is 24 is

(a) y ± 2x = 0

(b) 2y ± x = 0

(c) 3x ± 2y = 0

(d) 2x ± y = 0

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Q5. The points on the parabola y2 = 36x whose ordinate is three times the abscissa are

(a) (0, 0), (4, 12)

(b) (1, 3), (4, 12)

(c) (4, 12)

(d) none

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Q6. The line x + my + n = 0 will touch the parabola y2 = 4ax if

(a) mn = a2

(b) m = an2

(c) n = am2

(d) mn = a

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Q7. The straight line y = 2x + does not meet the parabola y2 = 2x is

(a) <

(b) >

(c) = 4

(d) 1

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Q8. Angle between two curves y2 = 4(x +1) and x2 = 4(y + 1) is

(a) 0°

(b) 90°

(c) 60°

(d) 30°

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Q9. The locas of the middle points of the chords of the parabola y2 = 4ax which passes through the origin

(a) y2 = ax

(b) y2 = 2ax

(c) y2 = 4ax

(d) x2 = 4ay

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Q10. The equation of the normal at the point to the parabola y2 = 4ax is

(a) 4x + 8y + 9a = 0

(b) 4x + 8y – 9a = 0

(c) 4x + y – a = 0

(d) 4x – y + a = 0

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**Solutions**

S1. Ans. (a)

Sol.



Required lucas is

(3y)2 = 4ax

9y2 = 4ax

S2. Ans. (c)

Soln.

S = (5, 0). Therefore lotus rectum = 4a = 20

S3. Ans. (b)

Sol.

Distance between locus and directrix is

S4. Ans. (b)

Sol.

y2 = 6.24

y = ± 12

i.e. the points are (24, 12), (24, – 12)

Hence lines are y = ± x

2y ± x = 0

S5. Ans. (a)

Sol.

y1 = 3x, According to given condition 9x12= 36x1

x1 = 4.0 y2 = 12.0

Hence the points are (0, 0) (4, 12)

S6. Ans. (c)

Sol.

y = x –

– =

n = am2

S7. Ans. (b)

Sol.

y = 2x + does not meet t

 > = =

 >

S8. Ans. (b)

Sol.

Principal axis of parabola are x – axis and y – axis i.e. angle between them is 90°.

S9. Ans. (b)

Sol.

Any line through origin (0, 0) is y = mx. If intersects y2 = 4ax is

mid point of the chord is

x = , y =

 = or y2 = 2ax.

S1. Ans. (b)

Sol.

y – a =

2y + x = 2a +

2y + x – = 0

4x + 8y – 9a = 0

**LEVEL-II**

Q1. Vertex of the parabola is

(a)

(b)

(c)

(d)

L3Difficulty3

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Q2. If the axis of a parabola is horizontal and it passes through the points (0, 0), and , then its equation is

(a)

(b)

(c)

(d) None of these

L3Difficulty3

Qtag Mathematics

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Q3. The equation of the latus rectum of the parabola represented by equation is

(a)

(b)

(c)

(d)

L3Difficulty3

Qtag Mathematics

Qcreator Pagemaker10

Q4. The parametric equation of the curve are

(a)

(b)

(c)

(d) None of these

L3Difficulty3

Qtag Mathematics

Qcreator Pagemaker10

Q5. The equation of parabola whose vertex and focus are (0, 4) and (0, 2) respectively, is

(a)

(b)

(c)

(d)

L3Difficulty3

Qtag Mathematics

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Q6. If the vertex of the parabola lies on -axis, then the value of is

(a)

(b)

(c)

(d)

L3Difficulty3

Qtag Mathematics

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Q7. The locus of the vertices of the family of parabolas is

(a)

(b)

(c)

(d)

L3Difficulty3

Qtag Mathematics

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Q8. The axis of a parabola is along the line and the distance of its vertex from origin is and that from its focus is If vertex and focus both lie in the first quadrant, then the equation of the parabola is

(a)

(b)

(c)

(d)

L3Difficulty3

Qtag Mathematics

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Q9. Tangent to the parabola at (1, 7) touches the circle at the point

(a)

(b)

(c)

(d)

L3Difficulty3

Qtag Mathematics

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Q10. The line is a tangent to the parabola if

(a)

(b)

(c)

(d)

L3Difficulty3

Qtag Mathematics

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**Solutions**

S1. Ans. (a)

Sol.

Hence vertex is

S2. Ans. (d)

Sol.

**Trick :** There will be no constant term in a curve which passes through (0,0). So none is correct.

S3. Ans. (c)

Sol.

Equation of latus rectum

( latus rectum to -axis) Focus is

Focus =

Equation of L.R. is

S4. Ans. (b)

Sol.

Parametric equations of are

Hence if equation is then parametric equations are

S5. Ans. (c)

Sol.

Vertex (0, 4); focus (0, 2);

Hence parabola is ,

S6. Ans. (c)

Sol.

Since the vertex of the parabola is given on -axis. Therefore, should be a perfect square. Therefore,

S7. Ans. (a)

Sol.

 Vertices will be

So that and

or

 Required locus will be .

S8. Ans. (d)

Sol.

Equation of directrix is

Hence equation of the parabola is

Hence equation of parabola is

S9. Ans. (c)

Sol.

Equation of tangent at to

This tangent also touches the circle

Now solving (i) and (ii), we get

Since, roots are equal so

So

Hence, point of contact is

S10. Ans. (a)

Sol.

From condition for tangent to a parabola,

**LEVEL-III**

Q1. The angle of intersection between the curves and at point (16, 8) is

(a)

(b)

(c)

(d)

L5Difficulty5

Qtag Mathematics

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Q2. The locus of a foot of perpendicular drawn to the tangent of parabola from focus, is

(a)

(b)

(c)

(d)

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

Q3. If the straight line touches the parabola , then the co-ordinates of the point of contact are

(a) (1, 1)

(b)

(c) (0, 1)

(d) (1, 0)

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

Q4. The value of for which the line is tangent to the parabola , is

(a)

(b)

(c)

(d)

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

Q5. A tangent to the parabola makes an angle of 45° with the straight line , then the equation of tangent is

(a)

(b)

(c)

(d) None of these

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

Q6. The angle between the tangents drawn at the end points of the latus rectum of parabola , is

(a)

(b)

(c)

(d)

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

Q7. The line touches the parabola if

(a)

(b)

(c)

(d)

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

Q8. The angle of intersection between the curves and is

(a)

(b)

(c)

(d)

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

Q9. The number of parabolas that can be drawn if two ends of the latus rectum are given

(a) 1

(b) 2

(c) 4

(d) 3

L5Difficulty5

Qtag Mathematics

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Q10. The point of intersection of tangents at the ends of the latus-rectum of the parabola is equal to

(a)

(b)

(c)

(d)

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

**Solutions**

S1. Ans. (a)

Sol.

Tangent at to both are

 …...(i) and ……(ii)

**Aliter :** Using direct formula

 where and

S2. Ans. (a)

Sol.

Tangent to parabola is, …..(i)

A line perpendicular to tangent and passing from focus

 is, …..(ii)

Solving both lines (i) and (ii)

S3. Ans. (c)

Sol.

 of tangent = .

Also, from equation of parabola, we get gradient at as the slope of parabola

Since line and parabola touch at

Putting this value in we have , so the point of contact is

**Aliter :** Tangent is

 Also curve is

 So,

So, point of contact is

S4. Ans. (d)

Sol.

Line : parabola :

 Condition of tangency :

S5. Ans. (c)

Sol.

Slope of tangent = or

Tangent is or

S6. Ans. (d)

Sol.

End points are

Tangents are or

Hence, angle between them is .

S7. Ans. (c)

Sol.

It touches, then

S8. Ans. (c)

Sol.

Point of intersection and

S9. Ans. (b)

Sol.

Facts : Only two parabola’s can be drawn with a given latus rectum.

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S10. Ans. (b)

Sol.

Equation of the tangent at on the parabola is

 In this case,

The co-ordinates at the ends of the latus rectum of the parabola are and

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Equation of tangent at and are and , which gives Thus, the required point of intersection is