MATHEMATICS

DPP

DAILY PRACTICE PROBLEMS

DPP No. 57

Total Marks : 58

Max. Time : 63 min.

Topics : Parabola, Ellipse, Hyperbola

Type of Questions		M.M., Min.
Single choice Objective (no negative marking) Q.1 to 6	(3 marks, 3 min.)	[18, 18]
Multiple choice objective (no negative marking) Q.7, 8	(5 marks, 4 min.)	[10, 8]
True or False (no negative marking) Q.9	(2 marks, 2 min.)	[2, 2]
Subjective Questions (no negative marking) Q.10 to Q.14	(4 marks, 5 min.)	[20, 25]
Match the Following (no negative marking) Q.15	(8 marks, 8 min.)	[8, 8]

1. The locus of the midpoint of the line segment joining the focus to a moving point on the parabola $y^2 = 4ax$ is another parabola with directrix

(A) $x = -a$ (B) $x = \frac{a}{2}$ (C) $x = -\frac{a}{2}$ (D) $x = 0$

2. A tangent at any point on the ellipse $4x^2 + 9y^2 = 36$ is cut by the tangent at the extremities of the major axis at T and T′ . The circle on TT′ as diameter passes through the point

(A) $(0, \sqrt{5})$ (B) $(\sqrt{5}, 0)$ (C) (2, 1) (D) $(0, -\sqrt{5})$

3. Area of the triangle formed by the tangents at the points (4, 6), (10, 8) and (2, 4) on the parabola $y^2 - 2x = 8y - 20$, is (in sq. units)

(A) 4 (B) 2 (C) 1 (D) 8

4. Tangents are drawn from the points on the line $x - y - 5 = 0$ to $x^2 + 4y^2 = 4$, then all the chords of contact pass through a fixed point, whose co-ordinates are

(A) $\left(\frac{1}{5}, \frac{4}{5}\right)$ (B) $\left(\frac{4}{5}, -\frac{1}{5}\right)$ (C) $\left(\frac{2}{5}, \frac{2}{5}\right)$ (D) (5, 0)

5. The point of intersection of tangents drawn to the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ at the points where it is intersected by the line $\ell x + my + n = 0$, is

(A) $\left(\frac{-a^2\ell}{n}, \frac{b^2m}{n}\right)$ (B) $\left(\frac{-a^2\ell}{m}, \frac{b^2n}{m}\right)$ (C) $\left(\frac{a^2\ell}{m}, \frac{-b^2n}{m}\right)$ (D) $\left(\frac{a^2\ell}{m}, \frac{b^2n}{m}\right)$

6. Let C be the centre, BCB′ the minor axis and S the focus $(ae, 0)$ of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$. B′S is produced to meet the ellipse again in the point P. If CP makes an angle ϕ with the positive direction of x-axis then $\tan\phi$ is equal to

(A) $\frac{(1-e^2)^{3/2}}{e}$ (B) $\frac{(1-e^2)^{3/2}}{2e}$ (C) $\frac{(1-e^2)^{1/2}}{2}$ (D) $\frac{(1-e^2)^{-1/2}}{e}$

7. The point P on the ellipse $4x^2 + 9y^2 = 36$ is such that the area of the $\Delta PF_1F_2 = \sqrt{10}$ where F_1, F_2 are foci. Then P has the coordinates

(A) $\left(\frac{3}{\sqrt{2}}, \sqrt{2}\right)$ (B) $\left(\frac{3}{2}, 2\right)$ (C) $\left(-\frac{3}{2}, -2\right)$ (D) $\left(-\frac{3}{\sqrt{2}}, -\sqrt{2}\right)$

8. For the hyperbola, $xy - 4x - 2y = 0$, which of the following is/are true?

(A) Asymptotes are $x = 2$ and $y = 4$.

(B) equation of transverse axis and conjugate axis are $x + y - 6 = 0$ and $x - y + 2 = 0$ respectively.

(C) length of transverse axis = length of conjugate axis = 8

(D) eccentricity of its conjugate hyperbola is $\frac{3}{2}$

9. Consider the following statements :

S_1 : If $x + y = k$ is a normal to $y^2 = 12x$, then $k = 9$

S_2 : The centre of ellipse $4x^2 + 9y^2 - 16x - 54y + 61 = 0$ is (2, 3)

S_3 : Co-normal points of ellipse lies on a circle.

State, in order, whether S_1, S_2, S_3 are true or false

(A) T T F (B) T F T (C) F T T (D) T T T

10. Tangents are drawn from any point on the hyperbola $\frac{x^2}{9} - \frac{y^2}{4} = 1$ to the circle $x^2 + y^2 = 9$. Find the locus of mid-point of the chord of contact.

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

12. Find the locus of the middle points of the chords of contact of tangents to the hyperbola $x^2 - y^2 = a^2$ from the points on its auxiliary circle.

13. Find the equation of common tangents to the hyperbolas $x^2 - y^2 = 18$ and $xy = 12$.

14. The foci of a hyperbola coincide with the foci of the ellipse $\frac{x^2}{25} + \frac{y^2}{9} = 1$. Find the equation of the hyperbola if its eccentricity is 2.

15. **Match the column**

Column - I		**Column - II**	
(A)	Tangents are drawn to the parabola $y^2 = 4x$ from (4, 4). If the normals drawn at the point of contact passes through (14, – k), then k is	(p)	3
(B)	If tangents from $(\lambda, 3)$ to the ellipse $\frac{x^2}{9} + \frac{y^2}{4} = 1$ are at right angles then λ is	(q)	2
(C)	Number of solutions of $\cos x + 2\sin x = 1$ in $[0, 2\pi]$ is	(r)	16
(D)	If normals at P and Q on the parabola $y^2 = x$ meet at (16, 4) on the parabola then $\frac{PQ^2}{119}$ is	(s)	– 2

Answers Key

1. D **2.** B **3.** B **4.** B

5. A **6.** B **7.** AD **8.** AC

9. A **10.** $\frac{x^2}{9}-\frac{y^2}{4}=\left(\frac{x^2+y^2}{9}\right)^2$ **11.** $y^2 = 8(x + 2)]$

12. $a^2 (x^2 + y^2) = (x^2 – y^2)^2$ **13.** $3x + y \pm 12 = 0$

14. $3x^2 – y^2 – 12 = 0$

15. (A) $\rightarrow$ r, (B) $\rightarrow$ q, s, (C) $\rightarrow$ p (D) $\rightarrow$ q