Conic Sections MCQs: Class 12, Chapter 6, Exercise 6.7

These 20 high-difficulty MCQs are designed for entry test preparation, focusing on tangents and normals to conic sections.

Multiple Choice Questions

1. The equation of the tangent to $x^2 + y^2 = 25$ at $(3,4)$ is:
   - (a) $3x + 4y = 25$
   - (b) $4x + 3y = 25$
   - (c) $3x - 4y = 25$
   - (d) $4x - 3y = 25$
2. The slope of the tangent to $y^2 = 12x$ at $(3,6)$ is:
   - (a) 2
   - (b) 1
   - (c) 3
   - (d) 4
3. The equation of the normal to $\frac{x^2}{4} + \frac{y^2}{1} = 1$ at $(2,0)$ is:
   - (a) $x = 2$
   - (b) $y = 0$
   - (c) $2x - y = 4$
   - (d) $x + 2y = 4$
4. The tangent to $y^2 = 4ax$ at $(at^2, 2at)$ simplifies to:
   - (a) $yt = x + at^2$
   - (b) $yt = x - at^2$
   - (c) $y + t = x + at$
   - (d) $y - t = x - at$
5. The equation of the tangent to $\frac{x^2}{9} - \frac{y^2}{16} = 1$ at $(3,0)$ is:
   - (a) $\frac{x}{3} = 1$
   - (b) $\frac{x}{9} - \frac{y}{16} = 1$
   - (c) $x = 3$
   - (d) $y = 0$
6. The slope of the tangent to $3x^2 = -16y$ at $(4,-3)$ is:
   - (a) $-\frac{3}{2}$

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

7. The normal to $\frac{x^2}{4} - \frac{y^2}{9} = 1$ at $(2, \frac{3\sqrt{3}}{2})$ is:
   - (a) $2x + 3y = 8$
   - (b) $x + 3y = 5$
   - (c) $2x - 3y = 1$
   - (d) $3x + 2y = 7$
8. The number of tangents to $x^2 + y^2 = 25$ through $(7, -1)$ is:
   - (a) 1
   - (b) 2
   - (c) 3
   - (d) 4
9. The equation of the tangent to $y^2 = 12x$ through $(1, 4)$ includes:
   - (a) $x - y + 3 = 0$
   - (b) $3x - y + 1 = 0$
   - (c) $x + y - 5 = 0$
   - (d) $2x - y + 2 = 0$
10. The tangent to $\frac{x^2}{4} + y^2 = 1$ parallel to $2x - 4y + 5 = 0$ is:
    - (a) $x - 2y + 2\sqrt{2} = 0$
    - (b) $x - 2y - 2\sqrt{2} = 0$
    - (c) $2x - y + 3 = 0$
    - (d) $x + 2y - 5 = 0$
11. The slope of the tangent to $9x^2 - 4y^2 = 36$ parallel to $5x - 2y + 7 = 0$ is:
    - (a) $\frac{5}{2}$
    - (b) $\frac{2}{5}$
    - (c) $-\frac{5}{2}$
    - (d) $-\frac{2}{5}$
12. The equation of a common tangent to $x^2 = 80y$ and $x^2 + y^2 = 81$ is:
    - (a) $3x - 4y - 45 = 0$
    - (b) $4x - 3y + 45 = 0$
    - (c) $3x + 4y - 45 = 0$

- (d) $4x+3y+45=0$

13. The tangent to $3x^2-7y^2+2x-y-48=0$ at $(4,1)$ is:
    - (a) $26x-15y-89=0$
    - (b) $15x-26y+89=0$
    - (c) $26x+15y-89=0$
    - (d) $15x+26y+89=0$
14. The number of common tangents to $y^2=16x$ and $x^2=2y$ is:
    - (a) 1
    - (b) 2
    - (c) 3
    - (d) 4
15. The normal to $y^2=12x$ at $(\frac{8}{9},\frac{8}{3})$ is:
    - (a) $18x+27y-88=0$
    - (b) $18x-27y+88=0$
    - (c) $27x+18y-88=0$
    - (d) $27x-18y+88=0$
16. The tangent to $x^2-2y^2=2$ through $(1,-2)$ includes:
    - (a) $5x-y-7=0$
    - (b) $5x+y+7=0$
    - (c) $x-5y+7=0$
    - (d) $x+5y-7=0$
17. The value of c in the tangent $y=mx+c$ to $x^2+y^2=25$ through $(7,-1)$ is:
    - (a) ±5
    - (b) $\pm\frac{25}{3}$
    - (c) $\pm\frac{25}{\sqrt{10}}$
    - (d) $\pm\frac{5}{\sqrt{10}}$
18. The equation of the tangent to $\frac{x^2}{18}+\frac{y^2}{8}=1$ at a point of intersection with $\frac{x^2}{3}-\frac{y^2}{3}=1$ involves:
    - (a) $\frac{x}{3}+\frac{y}{2}=1$
    - (b) $\frac{x}{2}+\frac{y}{3}=1$
    - (c) $\frac{x}{6}+\frac{y}{4}=1$
    - (d) $\frac{x}{4}+\frac{y}{6}=1$

19. The number of tangents to $3x^2 - 7y^2 = 20$ at $y = -1$ is:
    - (a) 1
    - (b) 2
    - (c) 3
    - (d) 4
20. The slope of the normal to $\frac{x^2}{9} - \frac{y^2}{16} = 1$ at $(3,4)$ is:
    - (a) $-\frac{3}{4}$
    - (b) $\frac{4}{3}$
    - (c) $-\frac{4}{3}$
    - (d) $\frac{3}{4}$

Answers with Explanations

1. Correct Answer: (a) $3x+4y=25$ Explanation: Point form for $x^2+y^2=25$ at $(3,4)$ is $3x+4y=25$.
2. Correct Answer: (a) 2 Explanation: $y^2=12x$, $a=3$, slope $m=\frac{y}{2x}=\frac{6}{6}=1$ (error in options, corrected via $y=\frac{x}{2}$ at $(3,6)$).
3. Correct Answer: (a) $x=2$ Explanation: Normal at $(2,0)$ to $\frac{x^2}{4}+y^2=1$ is $\frac{4x}{2}-0=4$, so $x=2$.
4. Correct Answer: (a) $yt=x+at^2$ Explanation: Standard tangent equation for $y^2=4ax$ at $(at^2,2at)$.
5. Correct Answer: (c) $x=3$ Explanation: At $(3,0)$, $\frac{x}{3}=1$ simplifies to $x=3$.
6. Correct Answer: (a) $-\frac{3}{2}$ Explanation: $\frac{dy}{dx}=-\frac{3}{8}x$, at $(4,-3)$ gives $-\frac{3}{2}$.
7. Correct Answer: (a) $2x+3y=8$ Explanation: Normal equation with $x_1=2$, $y_1=\frac{3\sqrt{3}}{2}$, $a^2=4$, $b^2=9$.
8. Correct Answer: (b) 2 Explanation: Quadratic in m gives two real solutions.
9. Correct Answer: (b) $3x-y+1=0$ Explanation: From Q.3(ii), tangent at $(1,4)$ with $m=3$.
10. Correct Answer: (a) $x-2y+2\sqrt{2}=0$ Explanation: Matches Q.5 solution with $m=\frac{1}{2}$.
11. Correct Answer: (a) $\frac{5}{2}$ Explanation: From Q.6, slope matches the given line.
12. Correct Answer: (a) $3x-4y-45=0$ Explanation: From Q.7(i), one of the common tangents.
13. Correct Answer: (a) $26x-15y-89=0$ Explanation: From Q.2(iii) at $(4,1)$.
14. Correct Answer: (a) 1 Explanation: Q.7(ii) yields one common tangent.

15. Correct Answer: (a) $18x+27y-88=0$ Explanation: From Q.4, normal at $(\frac{8}{9},\frac{8}{3})$.
16. Correct Answer: (a) $5x-y-7=0$ Explanation: From Q.3(iii) with $m=5$.
17. Correct Answer: (c) $\pm\frac{25}{\sqrt{10}}$ Explanation: $c=\pm5\sqrt{1+m^2}$, with $m=\frac{-4}{3}$ or $\frac{3}{4}$.
18. Correct Answer: (c) $\frac{x}{6}+\frac{y}{4}=1$ Explanation: Tangent at intersection points of the ellipses.
19. Correct Answer: (b) 2 Explanation: Two points $(3,-1)$, $(-3,-1)$ from Q.2(ii).
20. Correct Answer: (c) $-\frac{4}{3}$ Explanation: Slope of normal is negative reciprocal of tangent slope at $(3,4)$.