

# Assignment-01

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## SECTION B : JEE MAINS / AIEEE

- 1) Two common tangents to the circle  $x^2 + y^2 = 2a^2$  and parabola  $y^2 = 8ax$  are [2002]
  - (a)  $x = \pm(y + 2a)$
  - (b)  $y = \pm(x + 2a)$
  - (c)  $x = \pm(y + a)$
  - (d)  $y = \pm(x + a)$
- 2) The normal at a point  $(bt_1^2, 2bt_1)$  on a parabola meets the parabola again in the point  $(bt_2^2, 2bt_2)$ , then [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)  $t_2 = t_1 - \frac{2}{t_1}$
- 3) The foci of the ellipse  $\frac{x^2}{16} + \frac{y^2}{b^2} = 1$  and the hyperbola  $\frac{x^2}{144} - \frac{y^2}{81} = \frac{1}{25}$  coincide. Then the value of  $b^2$  is [2003]
  - (a) 9
  - (b) 1
  - (c) 5
  - (d) 7
- 4) If  $a \neq 0$  and the line  $2bx + 3cy + 4d = 0$  passes through the points of intersection of the parabolas  $y^2 = 4ax$  and  $x^2 = 4ay$ , then [2004]
  - (a)  $d^2 + (3b - 2c)^2 = 0$
  - (b)  $d^2 + (3b + 2c)^2 = 0$
  - (c)  $d^2 + (2b - 3c)^2 = 0$
  - (d)  $d^2 + (2b + 3c)^2 = 0$
- 5) The eccentricity of an ellipse, with its centre at the origin, is  $\frac{1}{2}$ . If one of the directrices is  $x = 4$ , then the equation of the ellipse is: [2004]
  - (a)  $4x^2 + 3y^2 = 1$
  - (b)  $3x^2 + 4y^2 = 12$
  - (c)  $4x^2 + 3y^2 = 12$
  - (d)  $3x^2 + 4y^2 = 1$
- 6) Let P be the point (1, 0) and Q a point on the locus  $y^2 = 8x$ . The locus of mid point of PQ is [2005]
  - (a)  $y^2 - 4x = 2$
  - (b)  $y^2 + 4x = 2$
  - (c)  $x^2 + 4y = 2$
  - (d)  $x^2 - 4y = 2$
- 7) The locus of a point P  $(\alpha, \beta)$  moving under the condition that the line  $y = \alpha x + \beta$  is a tangent to the hyperbola  $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$  is [2005]
  - (a) an ellipse
  - (b) a circle
  - (c) a parabola
  - (d) a hyperbola
- 8) An ellipse has OB as semi minor axis, F and F' foci and the angle FBF' is a right angle. Then the eccentricity of the ellipse is [2005]
  - (a)  $\frac{1}{\sqrt{2}}$
  - (b)  $\frac{1}{2}$
  - (c)  $\frac{1}{4}$
  - (d)  $\frac{1}{\sqrt{3}}$
- 9) The locus of the vertices of the family of parabolas  $y = \frac{a^3 x^2}{3} + \frac{a^2 x}{2} - 2a$  is [2006]
  - (a)  $xy = \frac{105}{64}$
  - (b)  $xy = \frac{3}{4}$
  - (c)  $xy = \frac{35}{16}$
  - (d)  $xy = \frac{64}{104}$
- 10) In an ellipse, the distance between its foci is 6 and minor axis is 8. Then its eccentricity is [2006]
  - (a)  $\frac{3}{5}$
  - (b)  $\frac{1}{2}$
  - (c)  $\frac{4}{5}$
  - (d)  $\frac{1}{\sqrt{5}}$
- 11) Angle between the tangents to the curve  $y = x^2 - 5x + 6$  at the points (2, 0) and (3, 0) is [2006]
  - (a)  $\pi$
  - (b)  $\frac{\pi}{2}$
  - (c)  $\frac{\pi}{6}$
  - (d)  $\frac{\pi}{4}$

- 12) For the Hyperbola  $\frac{x^2}{\cos^2 \alpha} - \frac{y^2}{\sin^2 \alpha} = 1$ , which of the following remains constant when  $\alpha$  varies = ?

[2007]

- (a) abscissae of vertices
- (b) abscissae of foci
- (c) eccentricity
- (d) directrix

- 13) The equation of a tangent to the parabola  $y^2 = 8x$  is  $y = x + 2$ . The point on this line from which the other tangent to the parabola is perpendicular to the given tangent is

[2007]

- (a) (2, 4)
- (b) (-2, 0)
- (c) (-1, 1)
- (d) (0, 2)

- 14) The normal to a curve at  $P(x, y)$  meets the x-axis at  $G$ . If the distance of  $G$  from the origin is twice the abscissa of  $P$ , then the curve is

[2007]

- (a) circle
- (b) hyperbola
- (c) ellipse
- (d) parabola

- 15) A focus of an ellipse is at the origin. The directrix is the line  $x = 4$  and the eccentricity is  $\frac{1}{2}$ . Then the length of the semi-major axis is

[2008]

- (a)  $\frac{8}{3}$
- (b)  $\frac{5}{3}$
- (c)  $\frac{4}{3}$
- (d)  $\frac{2}{3}$