Maths

Reg.No. : ☐☐☐☐☐☐

I.Answer all the Questions.

II.Use blue pen only.

Time : 02:00:00 Hrs

Total Marks : 85

Section-A

6 x 1 = 6

1) The tangents at the end of any focal chord to the parabola $y^2 = 12x$ intersect on the line

   (a) $x - 3 = 0$ (b) $x + 3 = 0$ (c) $y + 3 = 0$ (d) $y - 3 = 0$

2) The angle between the two tangents drawn from the point $(-4, 4)$ to $y^2 = 16x$ is

   (a) 45° (b) 30° (c) 60° (d) 90°

3) The eccentricity of the conic $9x^2 + 5y^2 - 54x - 40y + 116 = 0$ is

   (a) $\frac{1}{3}$ (b) $\frac{2}{3}$ (c) $\frac{4}{9}$ (d) $\frac{2}{\sqrt{5}}$

4) The length of the semi –major and semi minor axis of the ellipse $\frac{x^2}{144} + \frac{y^2}{169} = 1$ is

   (a) $26, 12$ (b) $13, 24$ (c) $12, 26$ (d) $13, 12$

5) The distance between the foci of the ellipse $9x^2 + 5y^2 = 180$ is

   (a) 4 (b) 6 (c) 8 (d) 2

6) If the length of major and semi-minor axes of an ellipse are 8,2 and their corresponding equations $y - 6 = 0$ and $x + y = 0$ then the equations of the ellipse is

   (a) $\frac{(x+4)^2}{4} + \frac{(y-6)^2}{16} = 1$ (b) $\frac{(x+4)^2}{16} + \frac{(y-6)^2}{4} = 1$ (c) $\frac{(x+4)^2}{16} - \frac{(y-6)^2}{4} = 1$ (d) $\frac{(x+4)^2}{4} - \frac{(y-6)^2}{16} = 1$

Section-B

5 x 3 = 15

7) Find the equation of chord of contact of tangents from the point (2,4) to the ellipse $2x^2 + 5y^2 = 20$

8) Find the equation of the ellipse if the foci are $(\pm 3, 0)$ and the vertices are $(\pm 5, 0)$

9) Find the equation of the ellipse if the centre is (3,-4) , one of the foci is $(3 + \sqrt{3}, -4)$ and $e = \frac{\sqrt{3}}{2}$

10) Find the equation of the ellipse if the centre at the origin , the major axis is along x axis , $e = \frac{2}{3}$ and passes through the point $\left(2, \frac{-5}{3}\right)$

11) Find the equation of the ellipse if the centre is (3,-1) , one of the foci is (6,-1) and passing through the point (8,-1).

Section-C

4 x 6 = 24

12) Find the equations of the tangent and normal To the parabola $y^2 = 12x$ at $(3, -6)$

13) Find the equations of the tangent and normal to the parabola $y^2 = 8x$ at $t = \frac{1}{2}$

14) Find the equations of the tangents to the parabola $y^2 = 6x$, parallel to $3x - 2y + 5 = 0$

15) Find the equation of the asymptotes to the hyperbola $8x^2 + 10xy - 3y^2 - 2x + 4y - 2 = 0$

Section-D

4 x 10 = 40

16) Find the axis, vertex, focus, directrix, equation of the latus rectum, length of the latus rectum for the following parabolas and hence draw their graphs

   $x^2 - 2x + 8y + 17 = 0$

17) The girder of a railway bridge is in the parabolic form with span 100ft. and the highest point on the arch is 10ft, above the bridge. Find the height of the bridge at 10ft, to the left or right from the midpoint of the bridge.

18) On lighting a rocket cracker it gets projected in a parabolic path and reaches a maximum height of 4mts when it is 6 mts away from the point of projection. Finally it reaches the ground 12 mts away from the starting point. Find the angle of projection.

19) a)   Find the equation of the hyperbola if the asymptotes are $2x + 3y - 8 = 0$ and $3x - 2y + 1 = 0$ and (5,3) is a point on the hyperbola.

    b)   Find the angle between the asymptotes of the hyperbola $4x^2 - 5y^2 - 16x + 10y + 31 = 0$

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