Q1. Find the equation of the circle which has its centre at the point (3, 4) and touches the straight line 5x + 12y − 1 = 0. **3 Marks**

Q2. Find the equation of the set of all points whose distance from (0, 4) are $\frac{2}{3}$ of their distance from the line y = 9. **3 Marks**

Q3. At what point of the parabola $x^2 = 9y$ is the abscissa three times that of ordinate? **3 Marks**

Q4. Show that the point (x, y) given by $x = \frac{2at}{1+t^2}$ and $y = \frac{a(1-t^2)}{1+t}$ lies on a circle for all real values of t such that $-1 \leq y \leq 1$ where a is any given real numbers. **3 Marks**

Q5. Find the equations of the hyperbola satisfying the given conditions. **3 Marks**
Vertices $(0, \pm 3)$, foci $(0, \pm 5)$

Q6. Find the equation of the following parabolas: **3 Marks**
Vertex at (0, 4), focus at (0, 2).

Q7. Find the length of the line segment joining the vertex of the parabola $y^2 = 4ax$ and a point on the parabola where the line-segment makes an angle θ to the x-axis. **3 Marks**

Q8. Find the equation of the circle which passes through (3, -2), (-2, 0) and has its centre on the line 2x - y = 3 **3 Marks**

Q9. Find the equation of the circle passing through the points: **3 Marks**
(5, 7), (8, 1) and (1, 3)

Q10. Find the equation of a circle with centre (2, 2) and passes through the point (4, 5). **3 Marks**

Q11. Show that the set of all points such that the difference of their distances from (4, 0) and (-4, 0) is always equal to 2 represent a hyperbola. **3 Marks**

Q12. If the equations of two diameters of a circle are 2x + y = 6 and 3x + 2y = 4 and the radius is 10, find the equation of the circle. **3 Marks**

Q13. If the lines 2x - 3y = 5 and 3x - 4y = 7 are the diameters of a circle of area 154 square units, then obtain the equation of the circle. **3 Marks**

Q14. Find the coordinates of the focus, axis of the parabola, the equation of the directrix and the length of the latus rectum. **3 Marks**
$y^2 = 10x$.

Q15. Show that the points (5, 5), (6, 4), (-2, 4) and (7, 1) all lie on a circle, and find its equation, centre and radius. **3 Marks**

Q16. Find the equation of a circle, **3 Marks**
Which touches x-axis at a distance 5 from the origin and radius 6 units.

Q17. Find the coordinates of the focus, axis of the parabola, the equation of the directrix and the length of the latus rectum. **3 Marks**
$x^2 = -16y$.

Q18. Find the equation of the parabola that satisfies the given conditions:
Vertex (0, 0), passing through (5, 2) and symmetric with respect to y-axis. **3 Marks**

Q19. Find the centre and radius of the circles. **3 Marks**
$x^2 + y^2 - 4x - 8y - 45 = 0$

Q20. If the line $y = mx + 1$ is tangent to the parabola $y^2 = 4x$ then find the value of m. **3 Marks**
[**Hint:** Solving the equation of line and parabola, we obtain a quadratic equation and then apply the tangency condition giving the value of m]

Q21. Find the equation of a circle passing through the point (7, 3) having radius 3 units and whose centre lies on the line $y = x - 1$. **3 Marks**

Q22. Find the coordinates of the focus, axis of the parabola, the equation of the directrix and the length of the latus rectum. **3 Marks**
$x^2 = -9y$.

Q23. Find the equation of the circle with. **3 Marks**
Centre (-a, -b) and radius $\sqrt{a^2 - b^2}$.

Q24. Show that the points (3, -2), (1, 0), (-1, -2) and (1, -4) are concyclic. **3 Marks**

Q25. Find the equation of a parabola with vertex at the origin, the axis along x-axis and passing through (2, 3). **3 Marks**

Q26. If the points (0, 4) and (0, 2) are respectively the vertex and focus of a parabola, then find the equation of the parabola. **3 Marks**

Q27. Find the equation of a parabola with vertex at the origin and the directrix, $y = 2$. **3 Marks**

Q28. Find the equation of the parabola that satisfies the given conditions: **3 Marks**
Focus (0, -3); directrix $y = 3$

Q29. Find the centre and radius of the circles. **3 Marks**
$x^2 + y^2 - 8x + 10y - 12 = 0$

Q30. Find the equation of the circle which passes through the points (3, 7), (5, 5) and has its centre on the line $x - 4y = 1$. **3 Marks**

Q31. Find the equation of the parabola whose focus is (5, 2) and having vertex at (3, 2). **3 Marks**

Q32. Find the equations of the hyperbola satisfying the given conditions. **3 Marks**
Foci $(0, \pm 13)$, the transverse axis is of length 24.

Q33. Find the equation of the circle which touches the axes and whose centre lies on $x - 2y = 3$. **3 Marks**

Q34. Find the equation of the hyperbola with eccentricity $\frac{3}{2}$ and foci at $(\pm 2, 0)$ **3 Marks**

Q35. Find the equation of the following parabolas: **3 Marks**
Focus at (-1, -2), directrix $x - 2y + 3 = 0$

Q36. Find the equation of the circle which circumscribes the triangle formed by the lines **3 Marks**
$x + y + 3 = 0$, $x - y + 1 = 0$ and $x = 3$

Q37. Find the coordinates of the focus, axis of the parabola, the equation of the directrix and the length of the latus rectum. **3 Marks**

$y^2 = -8x$.

Q38. Find the equations of the hyperbola satisfying the given conditions. **3 Marks**
Vertices $(\pm 2, 0)$, foci $(\pm 3, 0)$.

Q39. Find the vertex, focus, axis, directrix and latus-rectum of the following parabolas: **3 Marks**
$y^2 - 4y - 3x + 1 = 0$.

Q40. Find the coordinates of the focus, axis of the parabola, the equation of the directrix and the length of the latus rectum. **3 Marks**
$y^2 = 12x$.

Q41. If the lines $3x - 4y + 4 = 0$ and $6x - 8y - 7 = 0$ are tangents to a circle, then find the radius of the circle. **3 Marks**
[**Hint:** Distance between given parallel lines gives the diameter of the circle]

Q42. Find the equation of the circle which circumscribes the triangle formed by the lines **3 Marks**
$2x + y - 3 = 0$, $x + y - 1 = 0$ and $3x + 2y - 5 = 0$

Q43. If a parabolic reflector is 20cm in diameter and 5cm deep, find the focus. **3 Marks**

Q44. Find the equation of the circle which touches x-axis and whose centre is (1, 2). **3 Marks**

Q45. If the distance between the foci of a hyperbola is 16 and its eccentricity is $\sqrt{2}$, then obtain the equation of the hyperbola. **3 Marks**

Q46. Find the equation of a circle, **3 Marks**
Which touches both the axes at a distance of 6 units from the origin.

Q47. Find the equation of the hyperbola with: **3 Marks**
$\text{Foci } (0, \pm\sqrt{10}),\ \text{passing through} (2, 3)$

Q48. Find the equation of a circle, **3 Marks**
Passing through the origin, radius 17 and ordinate of the centre is -15.

Q49. Find the centre and radius of the circles. **3 Marks**
$2x^2 + 2y^2 - x = 0$

Q50. Find the equations of the hyperbola satisfying the given conditions. **3 Marks**
Foci $(\pm 5, 0)$, the transverse axis is of length 8.

Q51. Find the equations of the hyperbola satisfying the given conditions. **3 Marks**
Vertices $(0, \pm 5)$, foci $(0, \pm 8)$.

Q52. Find the equation of the circle with. **3 Marks**
Centre $\left(\frac{1}{2}, \frac{1}{4}\right)$ and radius $\frac{1}{12}$.

Q53. Find the equation of the parabola that satisfies the given conditions: **3 Marks**
Vertex (0, 0) passing through (2, 3) and axis is along x-axis.

Q54. In each of the followin find the equation of the hyperbola satisying the given conditions: **5 Marks**
foci $(\pm 5, 0)$, transverse axis = 8 [NCERT]

Q55. Show that the set of all points such that the difference of their distances from (4, 0) and (-4, 0) is always equal to 2 represents a hyperbola **5 Marks**

Q56. Find the coordinates of the point of intersection of the axis and the directrix of the parabola whose focus is (3, 3) and directrix is 3x - 4y = 2. Find also the length of the latus-rectum. **5 Marks**

Q57. In each of the followin find the equation of the hyperbola satisying the given conditions: **5 Marks**
vertices $(0, \pm 5)$, foci $(0, \pm 8)$ [NCERT]

Q58. Find the equation of the hyperbola whose, **5 Marks**
Focus is (2, 1) directrix is $2x + 3y = 1$ and eccentricity = 2

Q59. Find the axes, eccentricity, latus-rectum and the coordinates of the foci of the hyperbola: **5 Marks**
$25x^2 - 36y^2 = 225$

Q60. Find the equation of the hyperbola whose, **5 Marks**
Focus is (1, 1) directrix is $2x + y = 1$ and eccentricity $= \sqrt{3}$

Q61. Find the equation of the hyperbola, referred to its principal axes as axes of coordinates, in the following cases: **5 Marks**
Conjugate axis is 7 and passes throught the point (3,-2)

Q62. Find the equation of the parabola, if **5 Marks**
The focus is at (0, 0) and vertex is at the intersection of the lines x + y = 1 and x - y = 3.

Q63. Find the vertex, focus, axis, directrix and latus-rectum of the following parabolas: **5 Marks**
$y^2 = 8x + 8y$.

Q64. Find the equation of the parabola whose focus is the point (2, 3) and directrix is the line x - 4y + 3 = 0. **5 Marks**
Also, find the length of its latus-rectum.

Q65. Find the equation of the set of all points whose distance from (0, 4) are $\frac{2}{3}$ of their distances from the liney y = 9. **5 Marks**

Q66. In each of the following find the equation of the hyperbola satisfying the given conditions **5 Marks**
vertices $(0, \pm 6)$ $e = \frac{5}{3}$ [NCERT EXEMPLAR]

Q67. In each the following find the equation of the hyperbola satisfying the given conditions: **5 Marks**
Foci $(0, \pm 13)$, conjugate axis = 24

Q68. Find the vertex, focus, axis, directrix and latus-rectum of the following parabolas: **5 Marks**
$4x^2 + y = 0$.

Q69. Find the eccentricity, coordinates of the foci, equation of the directrices and lenght of the latus-rectum of the hyperbola **5 Marks**
$9x^2 - 16y^2 = -144$

Q70. Find the equations of the hyperbola satisfying the given conditions. **5 Marks**
Foci $\left(0, \pm\sqrt{10}\right)$, passing through (2, 3).

Q71. Find the equation of the hyperbola whose **5 Marks**
Focus is at (5, 2), vertex at (4, 2) and center at (3, 2)

Q72. Find the eccentricity, coordinates of the foci, equations of directrices and lenght of the latus-rectum of the hyperbola **5 Marks**
$3x^2 - y^2 = 4$

Q73. Find the eccentricity, coordinates of the foci, equation of the directrices and lenght of the latus-rectum of the hyperbola **5 Marks**

$4x^2 - 3y^2 = 36$

Q74. An arch is in the form of a parabola with its axis vertical. The arch is 10m high and 5m wide at the base. How wide is it 2m from the vertex of the parabola? **4 Marks**

Q75. In each of the following find the equations of the hyperbola satisfying the given conditions: **4 Marks**
Vertices $(\pm 2, 0)$, foci $(\pm 3, 0)$ [NCERT]

Q76. Find the coordinates of the foci and the vertices, the eccentricity and the length of the latus rectum of the hyperbolas. **4 Marks**
$\frac{y^2}{9} - \frac{x^2}{27} = 1$

Q77. Find the equation of the hyperbola whose **4 Marks**
Foci at $(\pm 2, 0)$ and eccentricity is $\frac{3}{2}$. [NCERT EXEMPLAR]

Q78. **Read the case study given below and answer the questions that follow:** **4 Marks**
An urban planner is designing a new park with a large, parabolic-shaped fountain. The fountain's parabolic shape ensures that water is distributed evenly over a wide area. By positioning the focus of the parabola at the base of the fountain, the designer can maximize the coverage area. The parabolic equation used is $y^2 = 4ax$, where a represents the distance from the vertex to the focus. The planner uses this equation to adjust the height and width of the fountain to meet specific aesthetic and functional requirements.

1. What is the general form of the parabolic equation used by the urban planner for the fountain?
2. In the equation $y^2 = 4ax$, what does the variable a represent?
3. If the urban planner decides that the distance from the vertex to the focus of the fountain should be 3 meters, write the specific equation of the parabola.

OR

3. Explain how the parabolic shape of the fountain ensures that water is distributed evenly over a wide area.

Q79. Find the equation of the hyperbola, referred to its principal axes as axes of coordinates, in the following cases: **4 Marks**
the distance between the foci = 16 and eccentricity $= \sqrt{2}$

Q80. Find the equation of the hyperbola whose **4 Marks**
Foci are (6, 4) and (-4, 4) and eccentricity is 2.

Q81. Find the equations of the hyperbola satisfying the given conditions. **4 Marks**
Vertices $(\pm 7, 0), e = \frac{4}{3}$.

Q82. A circle whose centre is the point of intersection of the lines 2x - 3y + 4 = 0 and 3x + 4y - 5 = 0 passes through the origin. Find its equation. **4 Marks**

Q83. Find the equations of the circles passing through two points on y-axis at distances 3 from the origin and having radius 5. **4 Marks**

Q84. A circle of radius 4 units touches the coordinate axes in the first quadrant. Find the equations of its images with respect to the line mirrors x = 0 and y = 0. **4 Marks**

Q85. Find the equation of the circle with radius 5 whose centre lies on x-axis and passes through the point (2, 3). **4 Marks**

Q86. Find the equation of the hyperbola whose **4 Marks**
Focus is at (4, 2) centre at (6, 2) and e = 2.

Q87. Find the equation to the circle which passes through the points (1, 1) (2, 2) and whose radius is 1. Show that there are two such circles. **4 Marks**

Q88. Find the coordinates of the foci and the vertices, the eccentricity and the length of the latus rectum of the hyperbolas. **4 Marks**
$9y^2 - 4x^2 = 36$

Q89. Find the equation of the circle passing through the points (2, 3) and (-1, 1) and whose centre is on the line x - 3y - 11 = 0. **4 Marks**

Q90. In each the following find the equation of the hyperbola satisfying the given conditions: **4 Marks**
Foci $(\pm 3\sqrt{5}, 0)$, the latus-rectum = 8 [NCERT]

Q91. In each the following find the equation of the hyperbola satisfying the given conditions: **4 Marks**
Foci $(\pm 4, 0)$, latus-rectum = 12 [NCERT]

Q92. **Read the case study given below and answer the questions that follow:** **4 Marks**
A company is setting up satellite dishes to receive signals in a rural area. Each dish is shaped like a parabola, with its focus positioned at the receiver to ensure the best signal quality. The dish is modeled by the equation $y^2 = 16x$. The engineers need to calculate the depth of the dish and the distance of the focus from the vertex to ensure optimal signal reception. This case study highlights how mathematical principles of parabolas are applied in real-world technology.

1. What is the standard form of the equation of a parabola that opens to the right?
2. Given the equation of the parabola $y^2 = 16x$, what is the value of a?
3. Calculate the distance of the focus from the vertex for the parabola $y^2 = 16x$.

OR

3. Find the depth of the dish at a point where the width of the dish is 8 units.

Q93. In each of the following find the equation of the hyperbola satisfying the given conditions **4 Marks**
foci $(0, \pm 12)$, latus-rectum=36 [NCERT]

Q94. **Read the case study given below and answer the questions that follow:** **4 Marks**
NASA engineers are calculating the trajectory of a spacecraft entering a new planetary system. The path of the spacecraft is an ellipse with the planet at one of the foci. The equation of the ellipse is $\frac{x^2}{36} + \frac{y^2}{25} = 1$. By analyzing this elliptical path, engineers can determine the closest approach and the speed required for the spacecraft to achieve a stable orbit. This case study demonstrates the practical application of elliptical geometry in space exploration.

1. Identify the lengths of the semi-major and semi-minor axes of the ellipse given by the equation $\frac{x^2}{36} + \frac{y^2}{25} = 1$.
2. What are the coordinates of the foci of the ellipse $\frac{x^2}{36} + \frac{y^2}{25} = 1$?
3. Calculate the eccentricity of the ellipse $\frac{x^2}{36} + \frac{y^2}{25} = 1$.

OR

3. Determine the distance between the foci of the ellipse $\frac{x^2}{36} + \frac{y^2}{25} = 1$.

Q95. **Read the case study given below and answer the questions that follow:** **4 Marks**
Engineers are designing a new roller coaster with a loop that has an elliptical shape. The major and minor axes of the ellipse are crucial for ensuring safety and a thrilling experience. The loop is modeled by the equation $\frac{x^2}{64} + \frac{y^2}{36} = 1$. The design team needs to calculate the dimensions and speed to ensure that riders experience the optimal thrill while maintaining safety standards. This case study shows how ellipses are used in engineering to create exciting amusement park rides.

1. What are the lengths of the major and minor axes of the ellipse represented by the equation $\frac{x^2}{64} + \frac{y^2}{36} = 1$?
2. What are the coordinates of the foci of the ellipse $\frac{x^2}{64} + \frac{y^2}{36} = 1$?

3. Explain how the equation $\frac{x^2}{64} + \frac{y^2}{36} = 1$ helps in determining the safety and thrill of the roller coaster loop design.

OR

3. If the maximum height of the roller coaster loop (minor axis) is increased by 2 units, how does it affect the equation of the ellipse and the dimensions of the loop?

Q96. A rod of length 12cm moves with its ends always touching the coordinate axes. Determine the equation of the locus of a point P on the rod, which is 3cm from the end in contact with the x-axis. **4 Marks**

Q97. Find the equation of the hyperbola whose **4 Marks**
Vertices are at (0 ± 7) and foci at $\left(0, +\frac{28}{3}\right)$.

Q98. Find the equation of the hyperbola, referred to its principal axes as axes of coordinates, in the following cases: **4 Marks**
conjugate axis is 5 and the distance between foci = 13

Q99. Find the equation of the circle, the end points of whose diameter are (2, -3) and (-2, 4). Find its centre and radius. **4 Marks**

Q100. Find the equation of the parabola, if **4 Marks**
The focus is at (0, -3) and the vertex is at (0, 0).